

Mission Support Implementation Plan

December 2006

A photograph of the Earth's horizon as seen from space, showing a bright, glowing line of light where the sun is rising or setting, with a blue and white atmosphere above and a dark, cloud-covered surface below.

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Message from the Deputy Administrator (will be included in the Final Plan)

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Note: The final version of this plan will include graphics to help illustrate some of the concepts in the document.

1.0 Mission Support Implementation Plan: Introduction

The President's announcement of the Vision for Space Exploration marked the beginning of a new era for NASA: exploring new worlds and settling the space frontier. The tasks are daunting, the challenges are unprecedented, and success will demand dramatic changes in the way NASA does business.

Achieving the Vision will require that NASA, as an enterprise, manage and fully leverage the capacities and capabilities of all Agency programs, projects, assets, and resources to meet current and future mission needs, even as those needs change over time. Without the contributions and support of NASA's mission support functions and staff throughout the Agency, success will not be possible. Clearly, mission support is on the critical path to mission success.

Risk is inherent in NASA's Mission. Robotic and human space exploration, scientific study, and aeronautics research are highly complex, technically challenging endeavors, and each embodies a high level of known risk. Institutional management decisions also can introduce risk to missions and lead to institutional failures, but these risks are often hidden. With an eye toward identifying and mitigating such risks, NASA must create the framework to manage institutional risk and ensure that NASA leaders factor institutional risk assessments into their decisions. The Agency's success in achieving the Vision for Space Exploration depends on NASA's ability to fully integrate and balance all aspects of the Agency's portfolio across programs, projects, and mission support organizations.

1.1 Mission Support Implementation Plan: Purpose and Contents

The NASA Strategic Plan establishes the Agency's Mission and long-term Strategic Goals and Sub-goals for achieving the President's Vision for Space Exploration. This Mission Support Implementation Plan (MSIP) is the critical first step in integrating the Agency's mission support (i.e., institutional) functions with NASA's programs and projects to support and enable mission success.

Achieving the Vision for Space Exploration requires a tightly integrated relationship between and among NASA's technical programs and mission support organizations. The MSIP establishes seven Mission Support Goals (MSGs) that will support achievement of NASA's Strategic Goals and Sub-goals. As such, it serves as the bridging document between these Agency-level Goals and the enabling activities and operations of NASA's mission support functions and organizations. Once fully implemented and operational, the MSIP will help ensure that the Agency's institutional portfolio supports NASA's Mission in manageable and measurable ways.

The over-arching purpose of NASA's mission support functions is to achieve a single target outcome: reduce institutional risk to mission. The MSIP defines and integrates specific goals, objectives, and risks to achieving the goals across five mission support functional areas: workforce, infrastructure, finance, information systems, and management systems. The MSIP also describes the High-Impact/High-Priority objectives that NASA will emphasize over the next year, as well as planned Agency-level actions that will ensure achievement of the MSIP goals.

Over time, NASA also will put in place structures and processes to ensure: 1) that risks are identified and understood by all parties, both institutional and programmatic; 2) that the most critical and cross-cutting institutional risks are elevated to appropriate levels; and 3) that consideration and evaluation of these risks informs Agency-level decisions on strategy, implementation approaches, and budgets.

The MSIP defines the roles and responsibilities of NASA's mission support functions and organizations in executing the NASA Strategic Plan and achieving NASA's Mission. Section 6 includes a set of Integrated Planning Team (IPT) White Papers in the five mission support functional areas. Each White Paper identifies an IPT "Owner" and includes mission support sub-goals, objectives, and performance metrics to ensure linkage of all institutional activities to the NASA Strategic Plan. The IPT Owners are responsible for overseeing implementation of their respective White Papers and for reporting periodically on the performance progress and achievements in each IPT area.

Mission support organizations at NASA Headquarters and at the Centers execute activities to support the goals, sub-goals, and objectives of the MSIP. Therefore, the mission support organizations will develop Management Plans to describe the specific actions to be taken, their alignment to the MSIP, and relevant performance measures.

In conjunction with publication of the MSIP, NASA will issue new Agency policies and procedures to institutionalize MSIP planning as a long-term, repeatable process that aligns mission support activities with NASA's Mission and supports informed decision-making. These new policies and procedures will support the roles of the MSIP as both a guidance document to ensure alignment of mission support activities to the Agency Strategic Goals and Sub-goals and as a working document to help NASA establish investment priorities as an integral part of the annual planning, budgeting, and execution process.

1.2 Mission Support Functions and Organizations: Roles and Responsibilities

Mission support functions are key institutional activities that play a critical role in ensuring NASA's success in achieving the Agency's Strategic Goals and Sub-goals. Just as NASA establishes and maintains the technical capabilities and resources necessary to execute programs and projects in exploration, science, and aeronautics research, the Agency also maintains the institutional capabilities, competencies, and resources needed to support these programs/projects and comply with external policies and regulations. Currently, nearly thirty NASA organizations provide mission support functions to the Agency.

1.2.1 NASA Headquarters

At NASA Headquarters, many mission support organizations are responsible for setting Agency policies and establishing procedures to implement institutional activities necessary to achieve NASA's Strategic Goals and Sub-goals. These organizations include Mission Support Offices (MSOs), functional offices within the MSOs and staff offices reporting to the Office of the Administrator. Mission support organizations maintain sufficient insight into program activities to ensure that NASA programs are conducted in accordance with all statutory, regulatory, and

fiduciary responsibilities. They also play a critical role in looking at the Agency's long-term program requirements and setting mission support strategies to address them.

The NASA Headquarters mission support organizations covered by the MSIP include:

- Office of Safety and Mission Assurance*
- Office of the Chief Engineer*
- Office of Program Analysis and Evaluation
- Office of the Chief Financial Officer
- Office of the Chief Information Officer
- Office of the General Counsel
- Office of the Integrated Enterprise Management Program
- Office of Security and Program Protection
- Office of the Chief Health and Medical Officer
- Office of Institutions and Management
- NASA Shared Services Center
- Office of Human Capital Management
- Office of Infrastructure and Administration
- Office of Diversity and Equal Opportunity
- Office of Procurement
- Office of Small and Disadvantaged Business Utilization
- Office of the Chief of Strategic Communications
- Office of Education
- Office of External Relations
- Office of Legislative Affairs
- Office of Public Affairs
- Office of Communications Planning

1.2.2 NASA Centers

NASA's Centers have the primary responsibility for identifying and meeting the institutional needs of the Agency's programs and projects. The Centers also are responsible for executing NASA-wide institutional policies and procedures when providing on-site support to program/project offices and personnel. In this way, Center mission support activities are linked directly to the success of all NASA missions.

To achieve optimum efficiency and reduce all possible risk to mission, each Center will be sized and staffed to meet its unique needs and to ensure that the skills and abilities of every employee are used fully. Each Center also will pursue ways to conserve resources and improve processes and procedures in ways that serve the Center's and the Agency's needs while contributing to achieving NASA's Mission. Each Center will undertake initiatives to integrate program/project and mission support activities to demonstrate the attributes of strong, healthy, productive Centers identified by NASA's Strategic Management Council:

* The Office of Safety and Mission Assurance and the Office of the Chief Engineer have programmatic as well as institutional responsibilities. The scope of this plan only covers their institutional activities.

- Clear, stable, and enduring roles and responsibilities;
- Clear program/project management leadership roles;
- Major in-house, durable spaceflight responsibility;
- Skilled, flexible, blended workforce with sufficient depth and breadth to meet NASA's challenges;
- Technically competent and value-centered leadership;
- Capable and effectively utilized infrastructure; and
- Strong stakeholder support.

1.2.3 Joint Responsibilities

Headquarters MSOs and the Center mission support organizations are jointly responsible for reducing known institutional risk to missions and for identifying and mitigating future institutional risks by initiating and implementing sustainability practices (i.e., processes, techniques, and innovative uses of resources that meet today's mission needs, but also take into consideration the longer-term consequences of their use).

Since the overall goal of mission support activities is to reduce institutional risk to mission, all resources should be focused on achieving this outcome. Investment priorities will be set based on a determination of an acceptable level of institutional risk to mission, and budgets will be aligned accordingly. Activities, expenditures, and assets not needed to support NASA's current or strategic requirements will assume lower priority, and Agency leaders will decide the appropriate disposition actions.

2.0 Mission Support Goals and High-Impact Objectives

NASA's seven Mission Support Goals (MSGs) reflect Agency's efforts to achieve a single target outcome: reduce institutional risk to mission by integrating technical programs and offices with the Agency's mission support functions and organizations to maximize resource efficiencies, fully leverage Agency capabilities, and minimize risk.

2.1 Mission Support Goals (MSGs)

MSG-1: Determine mission needs and corresponding institutional requirements through joint mission and institutional planning.

A significant amount of planning is performed within Mission Directorates and at the Centers in developing and implementing the technical requirements for Agency programs and projects. Headquarters Mission Support Offices (MSOs) and Center mission support organizations also conduct routine planning sessions to anticipate and prepare to meet Agency mission support needs (workforce, infrastructure, etc.). While some coordination occurs between program/project personnel and Headquarters/Centers mission support personnel, currently there is no systematic process or mechanism to ensure collaboration. Therefore, Headquarters and the Centers will work with program/project offices to formalize and institutionalize a collaborative, joint planning process that requires program/project managers to include Headquarters/Center mission support staff early in the life cycle process to ensure adequate support at all times.

MSG-2: Secure and align the skills, competencies, resources, and capabilities necessary to execute Agency missions effectively and efficiently.

Once adequate planning is in place to determine program/project needs for mission support, all NASA mission support offices will be responsible and accountable for delivering services and support to meet those needs. For example, program and Center offices need personnel with required skills and testing facilities with adequate capacity to meet their program/project needs. Currently, NASA has a misalignment between the skills and resources present in the Agency and those that NASA needs or will need in the future (e.g., workforce and infrastructure). This gap is primarily a result of the Agency's transition from operations (Space Shuttle and International Space Station) to development (Constellation) activities. However, understanding the nature of, and reasons for, the gap is only part of the solution. The Agency first must make an effort to align existing assets with mission needs, and then focus on creating or acquiring new capabilities if/when existing assets cannot be modified or enhanced to meet new requirements. Aligning existing assets includes seeking and seizing opportunities to use infrastructure owned by other government agencies, industry, academia, and international organizations, retraining workforce, and/or seeking out potential new partnerships. NASA also must eliminate the assets and resources the Agency no longer needs.

MSG-3: Create institutional flexibility by ensuring tools and processes are in place to respond to changing mission needs.

Since the Agency's creation in 1958, NASA has built and maintained institutional capabilities sufficient to achieve the Agency's Mission. Many of NASA's people and much of the Agency's infrastructure have been in place since the early days of NASA. This stability created a positive sense of permanence that served NASA well through the Apollo, Space Shuttle, and Space Station eras. However, the negative effect is the Agency's new realization that to meet evolving requirements efficiently, NASA needs a more flexible infrastructure and capabilities. Special legislation, like Enhanced Use Leasing, allows the Agency to leverage existing, underutilized assets to benefit NASA. By seeking, exploiting, and encouraging more tools like this, NASA can adapt better to changing circumstances and become more resilient.

MSG-4: Manage external requirements and expectations to optimize Agency missions.

Mission support organizations expend a substantial effort and significant resources responding to, and complying with, requirements levied by Congress, OMB, and other external sources. In some cases, the expenditure of efforts and resources in meeting these requirements contributes directly to mission success. In other cases, meeting the externally imposed requirements actually directs resources away from mission needs. For example, the initiatives of the President's Management Agenda (PMA) are intended to improve federal agency management in six functional/mission support areas: Strategic Management of Human Capital, Improving Financial Performance, E-Government, Budget and Performance Integration, Competitive Sourcing, and Real Property Asset Management. OMB monitors agency efforts to get to and stay at "Green," the highest PMA performance rating. Therefore, the focus of the mission support organizations has been to "Get to Green!" not because achieving this would contribute to mission success, but simply to comply fully with the PMA requirements. In the future, NASA will be examining the PMA initiatives and other external requirements, including compliance with existing laws and regulations, to explore ways of complying with the requirements while contributing more directly to mission success. In some cases, the Agency may ask external organizations levying the requirements to renegotiate acceptable performance standards and/or to adjust their expectations. Over time, such negotiations should enable NASA to establish a more balanced, mission-driven portfolio for the mission support organizations to manage.

MSG-5: Optimize Agency decision-making by integrating accurate, timely, and relevant institutional information with program and project information.

Every day, NASA managers make decisions affecting programs, projects, organizations, and individuals. On a regular basis, NASA's three governance councils (the Strategic Management Council, the Program Management Council, and the Operations Management Council) make high-level decisions regarding the Agency's strategic direction, program and project management, and operational issues. Since the impact of making poor decisions can be dramatic in terms of safety, cost, schedule, and Agency credibility, NASA managers must have accurate, timely, relevant information available to support informed decision-making. For example, if a program is being considered for cancellation due to cost overruns, the Agency's financial system must provide accurate, reliable, and timely cost information. Similarly, before NASA establishes

a new testing facility at a Center, program/project managers need to know what capabilities and facilities already exist that might meet the requirements, even if minor modifications are necessary

Integrated technical and institutional information has not been available consistently to support NASA's decision-makers. Therefore, the mission support organizations will develop a rigorous process that integrates technical and institutional information and ensures the availability, accuracy, and usefulness of this information to support key decisions.

MSG-6: Improve Agency risk management by integrating institutional, programmatic, and strategic risk management.

In accordance with NASA policies, program and project managers use technical risk principles and processes in executing their oversight responsibilities. Mission support managers, including Center institutional managers, oversee institutional services and capabilities that also may be on the critical path to program/project success. However, institutional risk historically has not been considered on the same level as technical risk to a project or strategic risk to the Agency. Currently, there is growing support for including institutional risk in program plans. NASA leaders are developing a proposal to establish a formal institutional risk management capability, to have it considered by program/project managers, and to have it balanced with programmatic and strategic risk.

Implementing institutional risk management as an integral part of programmatic and strategic risk assessment will require training for all mission support managers Agency-wide to ensure a common understanding of the policies, procedures, and "language" of risk. However, the benefits of formalizing institutional risk management within the program/project structure will outweigh the challenges of implementation by enabling better risk-informed decisions.

MSG-7: Sustain long-term mission viability by deploying processes, techniques, and innovations that meet today's requirements without compromising the ability to meet future needs.

Achieving the Vision for Space Exploration will require that NASA managers make some short-term decisions without benefit of having detailed information about the long-term operational impacts on future missions. For example, they may be choosing propellants for use on the Crew Exploration Vehicle (CEV) without knowing the full future impact of those propellants on the environment. While such decisions are necessary in research and development work, NASA will minimize potential long-term negative impacts by focusing on sustainable practices, flexible designs, adaptable processes, and creative thinking to short-term meet mission needs. NASA also will create opportunities for future innovations that could resolve potential problems that today's actions may create.

2.2 High-Impact Objectives

The seven Mission Support Goals described in Section 2.1 will help NASA achieve the Agency's Strategic Goals and Sub-goals and reduce institutional risk to mission through close

coordination between the technical programs and NASA's mission support organizations. The IPT White Papers, Sections 6.1 through 6.5, identify 17 sub-goals and 57 objectives that align directly to one or more of the seven Mission Support Goals and describe more specifically the purpose of integrating mission support within each functional area to ensure mission success.

NASA managers assessed the consequences and potential impacts to the Agency of not accomplishing each of the 57 mission support objectives. As a result of this assessment, they identified 24 as the Agency's High-Impact (Highest Priority) Objectives. Therefore, the Agency's mission support functions and organizations will focus on these 24 objectives during the first phase of MSIP implementation, and these 24 objectives will inform high-level decision-making during the upcoming budget cycle. (Section 5.2 identifies critical actions that NASA will take to achieve the Mission Support Goals, IPT sub-goals, and High-Impact Objectives.)

(Note: NASA is not committed to implementing and/or funding all 24 High-Impact Objectives, and the Agency may implement and/or fund objectives not included in this group of 24.)

MSIP Sub-Goals and High-Impact Objectives

Integrated Product Team (IPT) Functional Area
Sub-Goal
High Impact Objective
WORKFORCE
WF-1: Identify workforce requirements and develop plans to support mission needs, with sufficient flexibility to accommodate potential programmatic changes.
WF-1A: Based on current and projected mission needs, assess workforce requirements against availability and determine best method - or combination of methods - to meet needs, taking into consideration need to maintain core in-house capabilities, external requirements and constraints, as well as flexibility needed for the future.
WF-2: Ensure the needed workforce is available and aligned to achieve the mission efficiently and effectively.
WF-2A: Obtain high quality civil service workforce and ensure its alignment with the mission and its flexibility, as needed, over the long term.
WF-3: Build and sustain core in-house workforce capability, including leadership strength, needed to carry out NASA's mission efficiently and effectively.
WF-3A: Develop and sustain the core in-house science, engineering, and program and business management capability needed to conduct and support the mission.
WF-3B: Develop leadership ability at all levels and ensure leadership continuity, particularly in key positions.
WF-4: Provide information to allow sound decision-making concerning workforce planning, acquisition, and management.
INFRASTRUCTURE
IN-1: Obtain mission needs by conducting joint planning early and throughout the lifecycle of program and projects.
IN-1B: Ensure the formal integration of institutional considerations into programs and projects from project inception to completion and final asset disposition to provide more effective support to the mission.

Integrated Product Team (IPT) Functional Area
Sub-Goal
High Impact Objective
IN-1C: Prioritize and allocate infrastructure resources to balance optimal support of mission needs with externally levied requirements.
IN-2: Ensure that infrastructure, assets, and capabilities are aligned and configured to mission and available when needed.
IN-2A: Leverage and size assets, capabilities and resources to meet mission needs, eliminate excess capacity, and scale asset performance accordingly.
IN-2C: Transition shuttle infrastructure assets as appropriate, by developing and implementing disposition plans of unneeded assets to effectively and efficiently support the Vision for Space Exploration.
IN-3: Implement risk mitigation and sustainability practices across the Agency's infrastructure to prevent adverse mission impacts, protect mission resources, and enable the NASA mission to the fullest extent possible.
IN-3A: Integrate continuous risk management practices into the life cycle management of NASA's infrastructure to enhance mission support and sustainability.
IN-3B: Enhance mission performance and reduce life cycle costs of operations, maintenance, and disposition of infrastructure assets to ensure maximum funding is available to mission programs and projects through sustainability design practices and the implementation of new technologies.
FINANCE
FI-1: Ensure effective financial planning to meet the Agency's long-term mission requirements.
FI-1AP: Implement a process for assessing long-term financial resource needs, relative to Agency long-term mission plans.
FI-2: Align financial resources to the Agency's strategy.
FI-2A: Align Agency planning and budget requests to clearly and comprehensively support Mission requirements.
FI-2B: Execute Agency funding decisions in a manner consistent with approved Agency mission and institutional plans.
FI-3: Maximize funding for the mission.
FI-3C: Embed effective internal controls in all Agency financial management processes and practices.
FI-4: Provide reliable, accurate, and timely financial resources information for decision-making purposes.
FI-4B: Provide effective, easy-to-use financial and resource management information systems and reporting tools.
FI-4C: Integrate financial information systems, processes and data with other Agency (HR, Procurement, etc.) information systems, processes and data.
INFORMATION SYSTEMS
IS-1: Ensure operational information systems and services meet NASA mission and institutional requirements in the optimal manner, considering and balancing resource constraints, external requirements, and mission priorities.
IS-1A: Provide information and information technology solutions across NASA's portfolio elements that meet NASA's requirements in an optimal manner (centrally-managed/centrally-provided, centrally-managed/locally-provided, and/or locally-

Integrated Product Team (IPT) Functional Area
Sub-Goal
High Impact Objective
managed/locally-provided).
IS-1C: Conduct joint planning with mission entities on current information system and services performance and future requirements.
IS-2: Ensure new investments in IT systems and services are appropriately selected, controlled and evaluated based on Agency priorities and requirements.
IS-2B: Identify information and services gaps and overlaps, and develop/execute plans to ensure NASA has the proper information for decision-making and proper services to conduct mission and institutional activities.
IS-2C: Prioritize and select investments based on gap analyses, approved business cases and enterprise architecture reviews, balancing the optimal support of mission needs with externally levied requirements.
IS-3: Ensure the confidentiality, integrity, and availability of NASA information and information systems based on the categorization of the information processed by, or stored within, the systems.
IS-3A: Ensure information technology security is incorporated throughout the system life-cycle.
MANAGEMENT SYSTEMS
MS-1: Understand the components of the integrated agency management systems and implementing models to provide a baseline for measuring and improving the current processes, policies, procedures and tools.
MS-1B: Map the baseline integrated system of management system architecture, including the interdependencies, intersections and combined products.
MS-2: Ensure that an effective internal management controls system is developed and implemented.
MS-2A: Identify gaps and deficiencies between processes, policies, procedures and tools in, and/or barriers to success in fulfilling the purpose of the integrated system of management systems, and individual management system models.
MS-2C: Institute an on-going monitoring and reporting set of organizations, processes and procedures to track progress toward removing gaps and deficiencies, and ensuring the effectiveness and efficiency of the management systems.
MS-3: Remove known existing deficiencies in the NASA management systems, including integration deficiencies.

3.0 Mission Support Performance Management

NASA's ability to meet the Agency's Strategic Goals and Sub-goals is the key determinant of mission success.

3.1 Performance Measures

To ensure that all programs, projects, and Agency initiatives focus on the Agency's Strategic Goals and Sub-goals, NASA program managers annually update and/or develop a set of programmatic performance measures: multi-year performance Outcomes aligned to each Strategic Goal and Sub-goal; and a set of one-year Annual Performance Goals (APGs) aligned to each Outcome. NASA Program Managers also identify specific mission (programmatic) performance commitments, including cost, schedule, and deliverables, that support achievement of the Outcomes. Together, these strategic and programmatic measures form an Annual Performance Plan that is an integral part of NASA's annual Integrated Budget and Performance Document (IBPD).

Currently, a clear set of integrated Agency-level institutional performance measures does not exist. Historically, individual Mission Support Offices and Centers developed institutional performance measures for their functional areas. However, there has been little linkage of these institutional performance measures to NASA's programmatic measures and even weaker connection of the institutional measures to NASA's strategic measures. An important function of the new MSIP process and the MISIP is to define the first integrated set of institutional goals, objectives, and associated performance measures against which NASA can monitor and evaluate mission support performance.

3.2 Performance Monitoring and Reporting

NASA monitors and reports on programmatic measures externally and internally. The Agency reports progress toward achieving NASA's strategic directions as indicated by the programmatic measures in the annual Performance and Accountability Report (PAR). The programmatic measures are internally tracking and monitored by the NASA Program Management Council through the State of the Agency – Program/Projects process. A similar structure is envisioned for the institutional measures.

NASA will begin monitoring mission support performance across the Agency by tracking the overarching MSIP target outcome: reduce institutional risk to mission. Over time, NASA will add and track other long-term outcomes. The Agency will measure progress against the outcome(s) by establishing institutional APGs similar to those used to monitor programmatic and strategic performance. Although NASA's Annual Performance Plan and PAR will not include the institutional APGs, these measures will provide an unprecedented level of internal-use information and accountability.

NASA's Operations Management Council will track and monitor Agency-level institutional performance through a State of the Agency – Institutional process. NASA managers will use

additional forums, such as the Mission Support Implementation weekly meeting, to oversee and manage Agency-level institutional performance, and they will make adjustments or course corrections based on an analysis of the performance data.

As described in the IPT White Papers (Section 6), functional area sub-goal owners will track objectives and lower-level performance metrics. The process for tracking, monitoring, and reporting mission support performance at all levels will be described in the forthcoming MSIP procedural requirements document. (See Section 1.0)

4.0 Risk Management

NASA's overarching MSIP target outcome is to reduce institutional risk to mission, and the Agency will accomplish this by improving risk management at all levels of the Agency. The MSIP identifies the first set of NASA-level institutional risks. A defined method for monitoring these risks and implementing corrective action will follow.

4.1 Risk Management Oversight

NASA will oversee and manage Agency-level institutional risks in a number of ways. However, it is the responsibility of the IPT Owners (as identified in the IPT White Papers) to monitor the risks and potential barriers to accomplishing High-Impact objectives and to elevate "risks of concern" to the appropriate Headquarters entity. The IPT Owners will report these risks to the NASA Operations Management Council, and the Council will track the risks and take appropriate action.

4.2 Managing Risks to Achieving High-Impact Objectives

The focus of attention for the mission support organizations during the first phase of MSIP implementation will be on the issues and risks to meeting the 24 High-Impact Objectives (See Section 2.2).

Analysis of the issues and risks described in the IPT White Papers revealed the existence of several common, significant institutional issues and risks. (The IPT White Papers, Section 6, describe these issues and risks in detail. Mission support organizations currently are developing mitigation strategies for these risks, and these strategies will be incorporated into a later version of the MSIP.)

- The lack of a long-term focus on integrated mission support planning, and the lack of integration among program and mission support organizations for planning, could result in sub-optimized Agency decisions on resource alignment and implementation strategies.
- Lack of consistent, NASA-wide institutional approaches and tools, including the lack of common definitions and standards, could result in delayed implementation of the IPT sub-goals and objectives, increasing mission risk.
- Resources expended in response to external requirements (current and unforeseen), especially those requirements that would not be pursued if not required, could result in diminished resources available for mission application.
- The gap between the resources required to pursue and achieve the Mission Support Goals, IPT sub-goals, and objectives (funding and skills) and the resources currently available or in development, could prevent timely, efficient accomplishment of the Mission Support Goals.

5.0 Creating an Integrated Mission Support Capability

In addition to common institutional issues and risks that can be managed and mitigated by NASA's mission support organizations at local levels, other risks should be addressed at the Agency level to maximize integration among mission support functions and organizations, ensure consistency, and minimize overall negative impact on achieving NASA's Mission. The following action plan includes overarching strategies to create a cohesive, integrated mission support capability for NASA and thereby help the Agency reduce institutional risk to mission.

5.1 Action Plan Overview and Responsibilities

The IPT Owners will be responsible for overseeing actions to achieve the IPT sub-goals and objectives detailed in their respective IPT White Papers, with a focus on addressing the High-Impact Objectives. Some of these actions are underway already within the Headquarters and/or Center mission support organizations, such as developing leadership ability at all levels (workforce) and integrating financial and other Agency information systems, processes, and data (finance). Other activities and initiatives will be planned, developed, and implemented over the next three to five years. Headquarters mission support organizations will develop management plans in direct support of the MSIP to align their activities to the Mission Support Goals and the IPT sub-goals and objectives. IPT Owners also will update their respective White Papers, including the High-Impact Objectives, annually. Mission support function and organization managers will review and update Management Plans to realign activities, as necessary.

5.2 Action Plan: Critical Initiatives

Three short-term Agency initiatives are critical to the successful achievement of the seven Mission Support Goals. All of these critical initiatives: (a) are either foundational (i.e., they pave the way for the IPT sub-goals and objectives to follow); or (b) represent an integration of actions that must be carried out across all mission support functional areas. Accomplishing all three critical initiatives will help mitigate the common issues and risks identified in Section 4.2.

These three critical initiatives will be the first actions for which a set of NASA Mission Support Annual Performance Goals (APGs) will be developed, tracked, and reported (See Section 3.0). Each Mission Support APG will establish a measurable step that, once achieved, will contribute to the target outcome of reducing institutional risk to mission. The Operations Management Council will track these critical initiatives, summarized below, during the first phase of the MSIP implementation.

5.2.1 Critical Initiative 1: Establish an Integrated Agency Planning Process

Planning is the first step in any new program or initiative, and the planning process includes determining mission support needs early in the development process. The focus of this critical initiative is to leverage the initiatives that have already begun (e.g., workforce planning) and establish an integrated planning process that encompasses all mission support areas, as necessary. The scope of this critical initiative covers all Mission Directorates. Full

implementation requires that an Agency-level team, including representatives from Mission Directorates, Mission Support Offices, and Centers identify all new and existing planning activities and (to the extent possible) bring them together under a common framework with the goal of implementing an integrated planning process that complements and feeds into the planning cycle of the Agency Program Planning and Budget process.

NASA mission support organizations recognize the criticality of this initiative, and some are taking steps already to address the issue. For example, some mission support organizations have begun working with the Exploration Systems Mission Directorate to identify Constellation program and project needs.

5.2.2 Critical Initiative 2: Define a Strategy for External Requirements Management

Currently, NASA does not have a strategy to determine which externally imposed requirements support the Agency Mission. Congress, OMB, and regulatory federal agencies levy a significant amount of external policies, legislative and regulatory requirements, and other informational requests and operational mandates upon NASA organizations. Receiving organizations typically respond and/or comply individually, with little understanding of the potential impact of their action in other areas (e.g., whether or not implementation would reduce institutional risk to mission or otherwise hinder achievement of the Agency's Strategic Goals). In the absence of an integrated NASA-wide response strategy, these well-intended responses and efforts to comply often create conflicts between mission support areas, especially as they vie for limited funding and other resources.

NASA must manage the Agency's responses to, and compliance with, external requirements to ensure a balance between meeting the externally imposed requirements and achieving NASA's Mission. Therefore, the immediate focus will be to develop an Agency strategy to address externally levied requirements in a way that best serves the Mission. This critical action includes establishing a process for an investment analysis and prioritization among these external requirements.

5.2.3 Critical Initiative 3: Implement Risk-Based Institutional Management

NASA's missions perform risk management on a continual basis. The Agency has clear and abundant policies for programmatic risk management. Currently, however, there is no policy or formal structure for Agency-level risk management or for institutional risk management. Having such a policy and structure is key to understanding and pro-actively mitigating the Agency's "collective" risk to ensure the most efficient use of resources.

Institutional risk impacts the NASA's mission in several ways. Institutional risk can occur on a single project; e.g., a specific facility being unavailable to support that mission. Institutional risk can also be so cross-cutting that it results in the loss of a strategic asset that may be required in ten years, creating a long-term impact on multiple future missions. However institutional risk manifests itself, NASA leaders must manage it as diligently as they manage programmatic risk, since together they represent the collective risk to NASA strategy.

The Agency can mitigate potential institutional risks by implementing risk-based management: establishing policies, processes, procedures, and structures to manage institutional risk and ensure that NASA decision-makers factor institutional risk assessment into their decisions. Currently, NASA officials are rewriting the Agency's risk management policy to include institutional risk management. Additional actions will be required to supplement this effort and to establish a comprehensive process of risk-based institutional management. These actions will include establishing an institutional risk entity with a supporting structure that is linked to an Agency-level structure, and requiring risk management plans for each Mission Support Office.

6.0 Integrated Planning Team (IPT) White Papers

6.1 Integrated Product Team (IPT) White Paper - Workforce

Workforce IPT Owner: Assistant Administrator, Office of Human Capital Management
Point-of-Contact for White Paper: Carol Saric

Overview

NASA's most important resource in achieving the goals of the Vision for Space Exploration is the workforce. As NASA's history has demonstrated, it is the people – with the requisite skills and training and led by individuals with a clear commitment to NASA values – who will assure mission success.

The *NASA Strategic Plan* specifically addresses workforce issues, recognizing the importance of identifying, acquiring, and maintaining the core competencies needed to achieve the Vision and NASA's aeronautics and science missions. The *Strategic Plan* also recognizes that the Agency must develop a workforce flexible enough to adapt to any significant change in mission requirements. The flexibility is needed to support current issues such as the Space Shuttle transition but also to position the Agency to respond more nimbly to future mission changes. In addition, the *Strategic Plan* highlights NASA's reliance on its partners – industry, academia, other government agencies, and international partners – to achieve the Agency's missions and Vision and states the Agency's intention to engage a larger pool of innovators and potential partners through innovative partnerships.

These themes are reiterated in the *Strategic Management and Governance Handbook*, which identifies “strategic management of human capital” as one of the guiding principles of NASA's strategic management approach. The Handbook speaks to the importance of issues such as long-term workforce planning, the need for increasing workforce flexibility, and the need to reduce the risk of developing gaps or difficult to manage surpluses in needed competencies. It also outlines the need to pursue a strategy to take advantage of state-of-the-art techniques, methodologies, and solutions available within NASA, industry, academia, other federal agencies and other partners while preserving institutional expertise and strength.

In addition, the *NASA Workforce Strategy* – submitted to Congress in April 2006 – identified three underlying NASA civil service workforce principles: building and sustaining healthy Centers; maximizing the use of NASA's current human capital capabilities; and evolving to a more flexible, scalable workforce.

I. IPT Scope and MSO Involvement

Scope: The Workforce IPT is concerned with the strategic management of human capital; i.e. that policies, processes and structure are in place to ensure that critical workforce skills and capabilities are available and effectively used in the timeframe needed to enact the major activities of the Agency's mission.

Based on input received during early development of the Mission Support Implementation Plan framework and the Workforce white paper, the scope of the Workforce IPT has been expanded. The initial cope was limited to issues involving the civil service workforce and largely oriented around workforce management from a human resources perspective because, for several legal and practical reasons, the Government does not manage the contractor employee workforce. Besides the Agency HR community, led by the Office of Human Capital Management, working with its customers, the functional disciplines most directly involved in carrying out supporting tasks to achieve the earlier objectives were the Office of the Chief Engineer and the Office of Education. Given, however, that the Agency accomplishes its mission leveraging the skills and expertise of its in-house civil service workforce with support of industry, academia, and other partners, the Workforce IPT was urged to address not only the civil service workforce but also other ways in which the Agency's work is accomplished.

While NASA contractors are vital to the success of the Agency's mission – with on- and near-site contractor workforce significantly outnumbering NASA civil servants – it is essential that we recognize the contractual nature of the relationship between the Agency and its contractors. NASA manages its contracts through the procurement process, while contractors manage their workforce. Any focus on accomplishing NASA's work outside the civil service workforce must be addressed by the appropriate parties within the procurement process, with adherence to appropriate legal and regulatory constraints. The same is true of NASA's relationships with academia and other partners. The terms of the relationship are spelled out in the terms and conditions of the grant or other legal instruments. A specific objective, therefore, has been added to address the planning, execution, and management of contractual instruments and other types of agreements through which NASA acquires external support and expertise.

In addition, the Workforce IPT was asked to expand its scope to include not only those elements related to the management of the workforce but also to the environment in which NASA employees work.

The revised set of Workforce sub-goals and objectives are discussed in greater detail in Section II. Given the extremely broad potential scope and organizational participation in the expanded Workforce IPT, as the Mission Support Implementation Plan becomes operational, a workable process for coordinating and overseeing the many subordinate management plans will have to be developed.

MSO Involvement: Workforce issues, by their very nature, cross many organizations and technical disciplines. The expanded scope of the Workforce IPT has a corresponding expanded impact on the number of organizations responsible for achieving the Workforce sub-goals and objectives. In addition to the key roles played by: 1) the Office of Diversity and Equal Opportunity in ensuring an open and inclusive environment; 2) the Office of Education in assisting in the development of new sources of science, technology, engineering and math (STEM) talent; and that of 3) the Office of the Chief Engineer in enhancing in-house program/project management and systems engineering expertise – many other organizations contribute to the IPT.

Under the expanded Workforce IPT, for example, the Office of Procurement ensures the development of acquisition strategies, policies, and innovative approaches to acquire support from the contractor community and academia – and works with the Office of Small and Disadvantaged Business Utilization to ensure that the small business community has the opportunity to participate in doing business with NASA. The Offices of Chief Safety and Mission Assurance Officer, Security and Program Protection, and Chief Health and Medical Officer, respectively, among their many responsibilities, work to ensure a safe and secure work environment and the health and well-being of the NASA workforce. The Office of the Chief Information Officer and the Office of the Chief Engineer may, respectively, provide and/or identify IT and engineering tools that enable inter-Center teams to conduct programs and projects.

Participation of other Headquarters Mission Support Offices and organizations, as well as Centers, will depend on each organization's management plan and related tasks/activities. The participation of Mission Support Offices described in Section II is merely a first cut. As the Mission Support Implementation Plan and its process evolve, the roles of participating organizations will also evolve.

II. Sub-goals and Objectives

The Workforce sub-goals are structured around the concepts of: workforce planning; acquiring and aligning the civil service workforce and acquiring other external sources of support and expertise; developing and sustaining the civil service workforce; and better informed decision-making around workforce management through integrated, reliable workforce data.

Sub-goal WF-1: Identify workforce requirements and develop plans to support mission needs, with sufficient flexibility to accommodate potential programmatic changes.

Sub-goal WF-1 addresses strategic workforce planning, including make-or-buy decisions (i.e., performance by in-house civil service vs. contractor), integrated with program and business planning. Effective workforce planning is an essential component in assuring that NASA has the workforce needed to achieve its mission objectives. In a time of tight budgets and aggressive schedules, the Agency must ensure that it has a workforce planning process that links program/project, budget and workforce requirements, and is able to identify workforce needed to support the Vision and missions of NASA.

Objective WF-1A: Based on current and projected mission needs, assess workforce requirements against availability and determine best method – or combination of methods – to meet needs, taking into consideration the need to maintain core in-house capabilities, external requirements and constraints, as well as flexibility needed for the future.

The objective deals with more strategic, robust workforce planning, particularly Agency-wide workforce planning, that is better integrated with the planning of the work itself and with other business planning processes. Through a more integrated process, the Agency can better assess the existing skills and competencies of the current workforce against forecasted requirements,

identify potential misalignments (surplus and gap), and determine the appropriate means of getting work done.

This objective commits the Agency to enhancing existing workforce planning processes and developing new long-term planning processes. Not only will these changes integrate workforce planning with the annual budget planning cycle, but they will also support better multi-year planning across a spectrum of issues. The IPT will develop policies for total workforce management that will address issues such as contractor-civil service balance. The IPT will work with all stakeholders, including Mission Directorates, programs, Centers and Mission Support Offices to build common practices and structure across the Agency. It will involve the Office of Human Capital Management working with the Office of the Chief Engineer, the Office of the Chief Financial Officer, and the Office of Program Analysis and Evaluation to integrate workforce planning with program/project and business planning processes (e.g., NPR 7120.5 and the Program, Planning, Budgeting, and Execution (PPBE) process). This objective also covers improved Agency strategic planning guidance to Centers, clear workforce policies, enhanced workforce planning tools, development of measures (beyond “budget/full-time-equivalent” measures) to assess workforce capacity and capability and risks of misalignments. It will also consider the requirements of OMB Circular A-76 and the Federal Activities Inventory Reform (FAIR) Act, as well as procurement planning processes under the cognizance of the Office of Procurement.

Objective WF-1B: Plan for and manage the risk to mission of uncertainty in projected workforce requirements beyond the near-term budget horizon.

This objective highlights scenario – “what if” – planning as part of enhanced workforce planning capability. It envisions the inclusion of work or program scenarios with the planning process, as a mechanism for capturing and documenting the variability of work Centers may face and assist them in resource planning. Any given scenario could contain more than one variable (schedule, work content, work assignment, budget, etc.). The capability to do longer-term, futuristic scenario planning, beyond the near-term budget horizon, will also be pursued. This type of scenario planning would most likely be conducted only at the Agency level and would have limited impact on Center-level resource planning. The Office of Human Capital Management will work with the Mission Directorates and the Office of Program Analysis and Evaluation to establish appropriate scenarios, analyses of alternatives, etc.

Sub-goal WF-2: Ensure the needed workforce is available and aligned to achieve the mission efficiently and effectively.

Information derived from sound workforce planning will support timely decision-making regarding the acquisition and alignment of skills needed to support programs. The workforce must include the right balance of permanent and term civil service staff and contractors, and strategies must be developed that enable workforce flexibility based on changes in mission requirements. The Agency must also look to future availability of needed skills.

Objective WF-2A: Obtain high quality civil service workforce and ensure its alignment with the mission and its flexibility, as needed, over the long term.

Objective WF-2A involves aligning recruitment programs and civil service workforce reshaping efforts to meet the Agency's needs through a diverse workforce with requisite skills.

NASA's human capital management challenges are greater than ever. The Agency must complete the International Space Station, retire the Space Shuttle, develop new transportation and launch and support systems, maintain a robust science portfolio, and re-focus its aeronautics program in core disciplines and research areas appropriate to NASA's unique capabilities. In order to do this in a resource constrained environment, the Agency must ensure that it has plans and tools in place to acquire the civil service skills it needs for mission success – whether through recruitment or retraining. It must also have the ability to address areas of excess capacity, and to transition or reshape the workforce with minimal disruption. Retraining activities and transition tools, such as early out/buyout authority and career transition assistance, are included under this objective.

The Office of Human Capital Management and the Agency HR community will lead efforts to ensure the Agency has the appropriate programs, processes, and tools to acquire and reshape the civil service workforce and will coordinate with organizations such as the Office of Diversity and Equal Opportunity and the Office of General Counsel to ensure that such programs, processes, and tools address outreach and diversity considerations and legal requirements.

Objective WF-2B: Plan, execute, and manage instruments to acquire external expertise efficiently and effectively, fostering innovation where desired.

This objective addresses the acquisition of external resources through the planning, execution, and management of contracts, grants, and other types of agreements and innovative partnering arrangements. The focus is on creating and best utilizing new and/or traditional business approaches, technologies and methodologies to support the evolving mission portfolio in a challenging external environment; continuously improving the Agency acquisition process, anticipating evolving Agency needs; and creating acquisition strategies that will lay the foundations for multi-decadal programs while promoting successful conclusion of existing programs.

The Office of Procurement leads the development and implementation of policies, acquisition strategies and mechanisms, as necessary, to provide innovative approaches to acquiring contractor and academia support and coordinates with the Office of Small and Disadvantaged Business Utilization to ensure that small and small disadvantaged businesses have the opportunity to participate in NASA's contracted work through regulatory coverage and guidance that support implementation of socioeconomic programs and policies.

Objective WF-2C: Ensure a robust pipeline of future talent exists to meet projected future workforce needs.

Objective WF-2C deals with how NASA may contribute to ensuring a continued potential pool of talent with skills the Agency – and its partners – will need for the future. This includes contributing to the development of the science, technology, engineering, and math (STEM) workforce in disciplines needed to achieve NASA’s strategic goals, through a portfolio of investments. It also addresses attracting and retaining students in STEM disciplines through education support materials to enhance student skills and proficiency in STEM disciplines and opportunities for students, teachers and faculty to engage in authentic NASA-related, mission-based R&D activities.

The Office of Education leads the development, realignment, and management of education programs and investments to aid in the development of the science, technology, engineering, and math (STEM) workforce in disciplines needed to achieve NASA’s strategic goals for the long term, based on projected core competency needs identified by the Office of Human Capital Management, working with the Mission Directorates, PA&E, and the Centers. The Office of Education and the Office of Human Capital Management will also work to create a better link between Agency education programs and hiring efforts.

Sub-goal WF-3: Build and sustain core in-house workforce capability, including leadership strength, needed to carry out NASA’s mission efficiently and effectively.

The scope of sub-goal WF-3 is concerned solely with developing and managing the Agency’s civil service workforce, since contractors are responsible for developing and managing their personnel.

Objective WF-3A: Develop and sustain the core in-house science, engineering, and program and business management capability needed to conduct and support the mission.

The Agency must have a workforce with the right skills and competencies at the right time in order to accomplish its mission and implement the Vision. Developing and sustaining a workforce that is technically trained, as well as agile and scalable, to respond to mission changes is critical to achieving NASA’s goals. This objective covers the training and development of the Agency’s civil service workforce and includes such efforts as developing and strengthening program/project management and systems engineering competencies (particularly in a design and development environment) and facilitating knowledge sharing and lessons learned in these areas – as well as establishing approaches and mechanisms for developing and enhancing mission support/business skills and competencies. Career paths and mentoring strategies to support improved technical and business excellence will be pursued.

The Office of Human Capital Management partners with other functional offices to establish and maintain appropriate business management training and development, including career paths, designed to ensure that mission support functions continue to facilitate successful accomplishment of Agency programs and projects. The Office of the Chief Engineer takes the lead in developing in-house program/project management and engineering expertise.

Objective WF-3B: Develop leadership ability at all levels and ensure leadership continuity, particularly in key positions.

Objective WF-3B focuses on the need to maintain a strong leadership capability now and in the future. It encompasses leadership development at all levels, the creation of a succession management system, and effective leadership coaching and mentoring activities. The Office of Human Capital Management will evaluate current leadership development programs and revise them, as appropriate, to ensure that requisite leadership capabilities are being instilled in the current and future workforce.

Objective WF-3C: Establish and maintain an environment (including supporting systems, structures, tools, and processes) that enables the productivity, teamwork, shared focus, and contribution to mission needed for success.

This objective is extremely broad in scope and includes those things that can help or hinder the productivity of the workforce, including: performance management systems and rewards and recognition that clearly align with Agency goals; knowledge management efforts; effective internal communication; a safe, healthy, and secure workforce and work environment; and IT and engineering tools and processes to permit cross-center teams to work together more effectively, particularly when work packages are assigned to various Centers.

The Office of Human Capital Management will strengthen the linkage between employee and organizational performance works to ensure that all individual performance is focused on achieving the performance objectives of the organization and the Agency.

Other organizations play a significant role in creating a work environment conducive to facilitating achievement of NASA's missions. Among them:

- The Office of the Chief Engineer provides policy, direction, training, and oversight of NASA's engineering and program/project management activities and improves the Agency's engineering products and tools.
- The Office of the Chief Health and Medical Officer leads efforts to foster optimal health of employees throughout their NASA career and beyond, employing an evidence-based occupational and preventive health care system, with appropriate and timely interventions.
- The Office of Safety and Mission Assurance (OSMA) is responsible for leading efforts to maintain a strong safety culture throughout the Agency, in part, through comprehensive, well-integrated engineering and management processes oriented towards safety and mission success and a robust system of checks and balances, as well as through SRM&QA requirements and tools used by the NASA team to maximize the chance of safety and mission success for all programs.
- The Office of Security and Program Protection leads activities designed to ensure a secure environment (e.g., protecting people, assets, technology, information, and classified data) so that NASA may successfully accomplish its varied missions.

Sub-goal WF-4: Provide information to allow sound decision-making concerning workforce planning, acquisition, and management.

In order to know whether the Agency does a good job of workforce planning, acquiring and aligning internal skills and competencies and external support and expertise, and developing and sustaining in-house core capabilities – and to make better informed decisions in those areas, NASA must have reliable and useful data and methods of measurement.

Objective WF-4A: Develop workforce measures that could be used to assess risks associated with the current and future workforce, including civil service, support service contractors, and others.

Objective WF-4A covers the development of effective measures that can be used to assess risks associated with the current and future ability to get work accomplished. Because the scope of the Workforce IPT includes the conduct of work through external sources of support/expertise (particularly through contracts), as well as through an in-house civil service workforce, the types and sources of data and associated performance measures are very disparate. In some specific areas, data and measures already exist. In others, the Agency has not yet identified the precise data needed, the source of the data, or the ability to collect, manipulate, and ensure fidelity of the data without imposing an undue burden on those performing the activity. No comprehensive, integrated set of measures currently exists to give the Agency a complete picture. Work conducted under this objective will help move the Agency toward the establishment of a comprehensive set of measures.

The Offices of Human Capital Management and Procurement will lead development of appropriate measures for civil service workforce management (see objective WF-4B below) and contract management, respectively. The Office of Program Analysis and Evaluation will manage the incorporation of such measures into appropriate Agency management systems.

Objective WF-4B: Ensure information related to civil service workforce management is accurate, reliable, and available in a timely manner to support decision-making at all levels.

Objective WF-4B deals with workforce data specifically about the civil service workforce designed to give managers at all levels, the employees, and the HR function greater insight into civil service workforce management issues and assist in decision-making. Information about people, when integrated with financial and other information, will enable NASA to strategically plan its workforce for mission success. Comprehensive, authoritative information with near real-time access will enable agility and flexibility in responding to changing program requirements. This objective represents a commitment to provide the information NASA managers need to ensure the workforce is aligned with the current and planned work of the Agency, and perform long-term planning and forecasting. This objective also supports the mission by maintaining accountability for human capital decisions that support Agency readiness. The Office of Human Capital Management has lead responsibility for this objective.

High Priority Objectives

The above sub-goals and objectives represent a daunting workload. Through a series of exercises conducted during the MSIP Risk Management Workshop, held November 7 – 9, 2006, representatives from the Mission Support Offices, Mission Directorates, and Centers placed the Workforce objectives into 3 groupings, of approximately equal numbers, designated as “high,” “medium,” and “low” priority based on the consequences to the Agency of not achieving each objective. Consequences were identified on the basis of: Impact on Resources, Management Effectiveness/Efficiency, External Implications, and Future Sustainability. Rankings by the group at large were validated by the attending Workforce IPT. In prioritizing the Workforce objectives, it was recognized that all were significant and merited attention and all will be pursued as laid out in individual MSO management plans to be developed. Within the scope of the Workforce IPT, however, certain objectives stood out. Of the 10 objectives, the following four were determined to be the most critical in the short-term:

1. **WF-1A:** Based on current and projected mission needs, assess workforce requirements against availability and determine best method – or combination of methods – to meet needs, taking into consideration the need to maintain core in-house capabilities, external requirements and constraints, as well as flexibility needed for the future.
2. **WF-2A:** Obtain high quality civil service workforce and ensure its alignment with the mission and its flexibility, as needed, over the long term.
3. **WF-3A:** Develop and sustain the core in-house science, engineering, and program and business management capability needed to conduct and support the mission.
4. **WF-3B:** Develop leadership ability at all levels and ensure leadership continuity, particularly in key positions.

III. Performance and Accountability

Workforce-related measurement and assessment are essential in aiding NASA leaders and supervisors to effectively manage the Agency workforce. Measurement and assessment assist in identifying areas for improvement and/or increased emphasis, assessing whether existing activities and initiatives are producing the desired results, and ultimately, ensuring that workforce-related programs and policies support the Agency’s readiness to carry out the Vision for Space Exploration and NASA’s missions of science and aeronautics research.

Because the Workforce IPT scope, sub-goals, and objectives were recently significantly expanded and now encompass a much larger set of issues and organizations – and for the reasons mentioned in the discussion of WF-4 in Section II above – performance measures supporting the Workforce IPT are not all-encompassing. Work will continue in this area as the MSIP is implemented.

Outcome measures identified to date include the following:

Sub-goal WF-1: Identify workforce requirements and develop plans to support mission needs, with sufficient flexibility to accommodate potential programmatic changes.

- **Outcome Measure:** By September 30, 2008, Agency workforce planning processes result in identification of:
 - a.) Workforce size/composition misalignments that represent significant risk to mission success or institutional health, for given funding levels and
 - b.) Specific options for mitigating these risks at an Agency level.

Sub-goal WF-2: Ensure the needed workforce is available and aligned to achieve the mission most efficiently and effectively.

- **Outcome Measure:** By 2010, increase the mission capability index by 30 percent above the baseline.*
 - Mission Capability Index Components
 - Motivated: % of employees responding favorably to identified questions (Federal Human Capital Survey)
 - Understand roles: % of employees responding favorably to identified questions (Federal Human Capital Survey)
 - Competency match: % of competency matches (person compared to position requirements)
 - Properly trained: % of “targeted employee group” that has received “desired training”

Sub-goal WF-3: Build and sustain core in-house workforce capability, including leadership strength, needed to carry out NASA’s mission efficiently and effectively.

- Same as for WF-2 above.

Sub-goal WF-4: Provide information to allow sound decision-making concerning workforce planning, acquisition, and management.

- **Outcome Measure:** By 2009, increase the Human Capital Information System Use Index by 30 percent above the baseline.*
 - Human Capital Information System Use Index Components
 - % of managers that use the HC information system to make workforce planning decisions (annual survey)
 - % of systems that provide timely, useful information (ad hoc survey)
 - % of managers (and staff) that access the workforce planning quadrant (e.g., each month)
 - Reduction in data calls
 - % decline in stovepipe systems

* Caveat: Baseline numbers are still being determined for the index components. Once established, the target percentage increase will be reviewed.

IV. Issues and Risks

Among the most significant issues and/or problems that may prevent the Agency from achieving the high-impact Workforce objectives are the following:

Issue #	Issue/Problem Statement	Impact to IPT Plan	Remediation Approach
WF-I1	Resources are insufficient (e.g., travel funds, staffing) to accomplish required activities, particularly given that there are also competing demands on resources due to external requirements and normal functional management.	Several IPT Plan activities may have to be scaled back or delayed, resulting in delay or failure in achieving workforce IPT objectives and increased risk to mission.	Consolidate meetings/conferences. Use electronic alternatives (VITS, WebEx, etc) as feasible, recognizing their limitations. Continue to push back, where reasonable, on externally imposed requirements that do not support the mission and accept, as necessary, resulting impact. Focus resources on highest priority actions and scale back/delay others, as necessary.
WF-I2	The breadth of activities requires coordination and commitment across multiple functional and programmatic communities, which will be difficult to achieve.	Delay or failure to achieving workforce IPT objectives may result.	Undertake aggressive change management and education activities. Solicit and use buy-in from senior leadership. Use existing governance structures, processes and other forums, to the extent possible, to raise issues and obtain needed commitments.
WF-I3	Identifying and planning for workforce requirements is dependent upon Mission Directorates and programs/projects being able to identify with sufficient lead time and in sufficient detail the critical work to be accomplished, and the scope, location, and duration of the work.	Strategies to acquire and/or sustain and develop needed in-house capabilities may not be developed and implemented in time to adequately support program needs. Some work may have to be contracted, leading to erosion of in-house capability.	Agency workforce planning activities must be closely integrated with mission directorates and programs/projects. Planners must work closely with managers to help them accurately articulate workforce requirements that align to mission objectives.

WF-I4	It will be difficult to achieve the appropriate degree of commonality, and corresponding utility and efficiency, for Agency-wide programs and tools – while affording flexibility where possible – based on legacy systems that have been developed and used over the years.	The ability of the Agency to identify and address workforce issues on an Agency-wide basis will be compromised. Efficiencies will be lost because costs to maintain redundant programs, systems, and tools will not be available for use to address other priorities.	Undertake aggressive change management and education activities. Solicit and use buy-in from senior leadership on using common practices and processes. Continue to improve Agency systems, programs and tools, eliminating stovepiped Center approaches, as appropriate. Solicit input from users in development and enhancements. Develop a governance structure to control new program, system, and tool deployments and hold Centers accountable for terminating redundancies.
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The top ten risks that may prevent the Agency from fully achieving the high-impact Workforce objectives are addressed in the following Risk to Objective Focus Chart and reflected in the Risk Matrix Chart.

Mitigation strategies for these risks and issues are being developed and will be included in a future version of this white paper.

Risks to Objectives

Risk #	Concern	Risk Statement	Criticality	Likelihood	Consequence
WF-R1	Lack of early integration between program planning and workforce planning (WF-1A)	Given that program planning and workforce planning processes are not integrated early in the programmatic life cycle, there is a possibility in-house capabilities will not be available when needed by programs/projects or surplus capabilities will exist.	Med	4	3
WF-R2	Existing tools to capture workforce data may be inadequate for effective workforce planning (WF-1A)	Given that existing tools do not define competencies in a way that is useful to workforce planners, there is the possibility that	Med	4	3

		Agency personnel skill mix will not match needs.			
WF-R3	Analytical capability may not exist in sufficient depth across Agency to do workforce planning (WF-1A)	Given that NASA has not identified what skills are required to conduct effective workforce planning, there is the possibility that the Agency will not have the capability to do needed workforce planning.	High	5	3
WF-R4	Resources may not be available to allow outside hiring to meet mission requirements (WF-2A)	Given that there may be insufficient FTE ceiling/ dollars to obtain high quality civil service workforce, there is the possibility the Agency may be unable to fill critical skill needs.	High	5	4
WF-R5	Hiring process lengthy (WF-2A)	Given that the hiring process is cumbersome and lengthy, there is the possibility that the Agency may be unable to obtain the best candidates for critical positions in a timely manner.	High	5	3
WF-R6	Resources may not be available to attract the best talent (WF-2A)	Given that resources are limited, there is the possibility the Agency may be unable to use the flexibilities available to attract the best candidates.	Med	3	2
WF-R7	Lack of clear understanding of core requirements (WF-3A)	Given that we lack a clear understanding of core requirements, there is the possibility that improper skill mix (surplus skills) will result in increased costs.	High	4	4
WF-R8	Programs/projects focus on near-term workforce requirements (WF-3A)	Given that programs tend not to focus on longer-term workforce needs, there is the possibility that sustainable core capability will be compromised.	High	4	4
WF-R9	Inadequate strategy for sustaining core	Given that workforce planning does not			

	competencies (WF-3A)	account for sustaining workforce competencies, there is the possibility that future in-house mission core competencies will not exist.	Med	3	3
WF-R10	Workload demand competes with need for leadership development (WF-3A)	Given that leadership development is not seen as a priority given other workload demands, there is the possibility that the Agency will have poorly trained managers making supervisory and strategic decisions.	High	5	3

RISK ASSESSMENT

Likelihood	5			WF-R3 WF-R5 WF-R10	WF-R4	
	4			WF-R1 WF-R2	WF-R7 WF-R8	
	3		WF-R6	WF-R9		
	2					
	1					
		1	2	3	4	5
Consequences						

Criticality	Consequence
High	<ol style="list-style-type: none"> 1. Minimal or no impact 2. Acceptable impact with no change in approach 3. Acceptable impacts with workarounds 4. Unacceptable impact could result in substantial workarounds 5. Major impacts could result in failure.
Med	
Low	

6.2 Integrated Product Team (IPT) White Paper - Infrastructure

Infrastructure IPT Owner: Assistant Administrator, Infrastructure and Administration
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Overview

Reduction of risks to mission success is the overriding focus of the Infrastructure IPT component of the Mission Support Implementation Plan. Infrastructure performance risk and lack of infrastructure capacity, capability, or availability can seriously jeopardize NASA's ability to meet its mission objectives by causing delay or damage to mission in the following ways: cost increases; schedule delays; loss/compromise of mission hardware and/or critical infrastructure assets and/or critical program information/technology; and/or, degraded mission performance. Identifying and mitigating infrastructure risks early in program and project planning, and working in conjunction with program and project managers, increases the likelihood of timely and successful mission accomplishment and provides NASA's missions with a stable, reliable, effective institutional base of support and ensures the health and safety of NASA workforce and the general public.

The goals and objectives of the Infrastructure IPT are specifically designed to assure that appropriately configured institutional assets and capabilities are available to mission when needed. Meeting these goals and objectives requires continuous communication and the development of collaborative relationships with program customers to understand their requirements and to articulate institutional requirements, resulting in prioritized and optimized mission support Agency-wide. Because the Infrastructure IPT functional areas include external requirements and externally-mandated constraints, as well as the use and disposition of government-owned real and personal property, this functional area must be configured and aligned with mission to maximize benefit to the Agency vision and missions, while at the same time assuring NASA compliance with applicable federal, state, and local laws and regulations.

Effective execution of the six strategic goals and healthy center attributes identified in the FY2006 NASA Strategic Plan requires a fundamental shift Agency-wide in the way mission support offices engage to support the missions of NASA, moving from a functional operations-oriented support structure, to a more flexible and adaptable mission support structure. The sub-goals and objectives enumerated below are thus designed to ensure that NASA's base of mission support will adapt to enable new development work and the operational concepts required to implement NASA's vision and future missions, including the Vision for Space Exploration. Fulfillment of the Infrastructure IPT Sub-goals and objectives is designed to mitigate current and future infrastructure risks by requiring early joint planning with mission for infrastructure requirements (such as construction or demolition of facilities, aircraft operations and management, facility security, design for new facilities, occupational safety, health, and environmental activities to conform with the requirements of NEPA, OSHA, NFPA, environmental

Infrastructure Examples of External Requirements and Mandates

- National Environmental Policy Act (NEPA)
- Occupational Safety and Health Act (OSHA)
- Americans with Disabilities Act (ADA)
- National Historic Preservation Act (NHPA)
- Protection standards from the National Fire Protection Association (NFPA)
- Myriad statutes, laws and regulations governing every aspect of institutional operations, including but not limited to; Executive Orders (EO), Presidential Decision Directives (PDD), and Homeland Security Directives (HSPD) concerning the authorities and responsibilities for security, program protection, and emergency preparedness

remediation activities and the positioning of logistics supply chains) in the life cycle of programs and projects, and by deploying sustainable practices such as materials assurance, Center encroachment management, and facilities condition modeling.

I. IPT Scope

The functional areas included within the scope of the Infrastructure IPT include Management of Facilities and Real Property, Aircraft, Environment, and Logistics assets and capabilities. In addition to the institutional resources within the scope and control of the Office of Infrastructure and Administration (I&A), there are critical dependencies and points of coordination and collaboration across organizations and functional areas outside the I&A organization, and the Infrastructure IPT goals and objectives account for these key touch points. These key areas include occupational safety and health, critical infrastructure protection, physical security and access control, emergency preparedness, industrial safety, equal opportunity and diversity and information technology. The table to the right of this paragraph outlines some of these cross-over points with other programs. Lastly, the Infrastructure IPT includes the Shared Capability Assets Program (SCAP), an agency-wide activity within the Cross-Agency Support Program budget theme. The Infrastructure IPT goals and objectives are integrated with these functional areas to eliminate potential gaps otherwise caused by organizational “stovepipes.”

INFRASTRUCTURE	LINKED To	OTHER PROGRAM
Occupational Safety, Health, and Environment	→	Chemical Management
Critical Infrastructure Protection	→	Energy Needs
Physical Security/Access Control	→	Entrance barriers, electronic surveillance tools
Emergency Preparedness	→	In-place shelters
Industrial Safety	→	Noise Attenuation, fire protection
Equal Opportunity	→	Compliance with Americans with Disabilities Act accessibility issues
Information Technology	→	Rooms/buildings to house computers/IT equipment

Infrastructure /Program Linkages

II. Sub-goals and Objectives

Requirements- To assure Infrastructure assets and capabilities are available in the timeframe needed by reducing the current and future institutional, programmatic and operational risk to mission through:

1. Effective management of existing infrastructure and institutional systems;
2. Enhanced institutional planning and decision-making; and

3. The proactive deployment of risk mitigation practices and technologies (e.g. materials assurance, sustainable facility design, construction and operations, and Center encroachment reduction).

Sub-goal IN-1: Obtain mission needs by conducting joint planning early and throughout the lifecycle of program and projects.

NASA Program and Project Managers routinely identify and plan early with the Mission Directorates and Centers on the technical requirements for their programs and projects. This process has been developed over time and is clearly spelled out in several NPR's (e.g. 7120.5). The integration of MSOs or Center Institutional Offices into that early stage planning process does not currently occur, primarily because there is no systematic process or mechanism to encourage this interaction. It is critical that MSOs/Centers obtain mission needs early (and throughout) the life cycle of the project if they are to effectively support the mission and ensure that necessary infrastructure is in place when it is needed.

Objective IN- 1A: Formalize an infrastructure planning process linked with the Programs, Projects, Budget, and Execution (PPBE) process.

The PPBE Process already links to the Agency Strategic Plan through guidance issued to budget developers, analysis of budget requests, and funding allocation decisions. By incorporating infrastructure planning into that process, Program and Project Managers will be required to consider their infrastructure needs early in (and throughout) the development cycle, thereby ensuring assets will be appropriate and available when they are needed by mission.

Objective IN-1B: Ensure the formal integration of institutional considerations into programs and projects from project inception to completion and final asset disposition to provide most effective support to mission.

Oftentimes, infrastructure needs change as the project matures. In order to ensure the timeliness and appropriateness of assets to the Programs and Projects, it will be necessary to incorporate a review of those needs throughout the project life-cycle, and revising as necessary.

Objective IN-1C: Prioritize and allocate infrastructure resources to balance optimal support of mission needs and externally levied requirements.

NASA has, in the absence of other guidance, historically determined that complete and thorough compliance (obtaining "green" status) with all external requirements was the only acceptable way to address these issues. In fact, some of the requirements if not adhered to strictly, do not present any additional risk to the Agency, the environment, or the planet. Those requirements that do not present a risk, will be re-evaluated and funding may be reallocated to other more mission-critical needs as deemed appropriate.

Sub-goal IN-2: Ensure that infrastructure, assets, and capabilities are flexible, aligned, and configured to mission and available when needed.

NASA's aging infrastructure (most facilities are over 40 years old) coupled with designs that were single-use in nature, have resulted in facilities that are obsolete, many that are incapable of retrofitting to accommodate new mission requirements, and assets that are no longer needed. As NASA moves forward with the new Vision for Space Exploration, it is imperative that our infrastructure be realigned to allow for greater flexibility of use, that outdated and unusable assets are outsourced or disposed of, and that our infrastructure assets incorporate a vision for the future that includes multiple uses and options.

Objective IN-2A: Leverage and size assets, capabilities, and resources to meet mission needs, eliminate excess capacity, and scale asset performance accordingly (SCAP).

NASA has acquired, through the years, assets that are obsolete, aging, and present an economic burden to maintain. By "right-sizing" our assets, excess capacity will be eliminated and resources will be allocated where they are needed.

Objective IN-2B: Ensure that institutional systems and infrastructure are resilient, flexible, and adaptable to meet changing mission needs.

NASA has historically built single use facilities and assets that are incapable of being adapted to different needs than those originally envisioned in the design. As mission needs change, NASA's assets must be flexible enough to change with them. The economic burden of continuing to design and build for single use, is not consistent with a need for flexibility and resiliency in Agency assets.

Objective IN-2C: Transition shuttle infrastructure assets as appropriate, by developing and implementing disposition plans of unneeded assets to effectively and efficiently support the Vision for Space Exploration.

Many of the shuttle infrastructure assets were prime examples of designing for single-use. As the shuttles are decommissioned, and their assets are no longer needed, it is critical that those assets determined to be no longer usable or needed be removed from Agency inventory. It is not cost effective to continue to maintain facilities or assets that are no longer needed.

Objective IN-2D: Develop synergistic partnerships, leasing models, and strategic alliances with the private and public sectors; pursue innovative procurement and acquisition strategies; and tailor asset management systems to provide the most effective support to mission

Alternative procurement strategies; whether through partnerships, alliances, or enhanced leasing programs; can free up funding identified for specific projects and allow it to be reallocated to mission.

Sub-goal IN-3: Implement risk mitigation and sustainability practices across the Agency's infrastructure to prevent adverse mission impacts, protect mission resources, and enable the NASA mission to the fullest extent possible.

While risk management has been effectively integrated within the technical areas of NASA, the concept of *infrastructure* risk is only just being explored. These risks to mission include disasters (both natural and human-induced), dependence on non-renewable resources, failure to adequately compensate for changing external requirements, and the tendency to view

“first-cost” of an asset without considering the “full-cost” of that asset. In order for NASA’s infrastructure to adequately support the mission, it is imperative that we begin to plan and develop alternative energy capabilities that are not dependant on wildly fluctuating external demands, look to future needs in master planning and develop systems that are capable of multiple uses with multiple functions.

Objective IN-3A: Integrate continuous risk management practices into the life cycle management of NASA’s infrastructure to enhance mission support and sustainability.

As mentioned above, infrastructure risks are still being identified and analyzed. In keeping with the Agency’s overall approach to risk management, these risks will be formally documented, assessed, and then managed. This process will help ensure that infrastructure assets will be available to mission when needed.

Objective IN- 3B: Enhance mission performance and reduce life cycle costs of operations, maintenance, and disposition of infrastructure assets to ensure maximum funding is available to mission programs and projects through sustainability design practices and the implementation of new technologies.

As resources become more scarce or expensive to procure, the need for alternative methods for obtaining those mission critical needs will become more pressing. While NASA does not currently have a fully mature sustainable design practice, the development of such a practice is in keeping with NASA’s mission to develop new and innovative answers to pressing issues both here on Earth and in outer space.

Objective IN-3C: Reduce the cost of energy and increase resiliency of energy supplies for facilities and transportation operations through the use of alternative energy technology and capabilities.

The cost of energy currently fluctuates wildly, making it difficult to determine exact needs and, although it has yet to become a scarce commodity, most of NASA’s energy needs come from non-renewable energy sources. In order to ensure a consistent and steady energy supply, as well as reduce the overall costs of Agency energy needs, NASA must invest in alternative technologies.

Objective IN-3D: Ensure that infrastructure management systems are sustainable and able to meet evolving mission and institutional needs.

The internal management controls and systems within NASA, must be as flexible and as resilient as our other assets to meet the challenges of changing and evolving missions. Internal systems must be able to adapt to whatever mission needs arise, and be capable of changing to meet those needs.

Objective IN-3E: Deploy and maintain risk practices which focus on sustainability.

The inability of the Agency to supply necessary assets such as energy and critical materials needed by missions is a serious risk facing the Agency. Only by focusing on long-term sustainable solutions to these problems can these issues truly be resolved.

Objective IN-3F: Inject formal continuous risk management analysis into master planning and functional reviews to identify and mitigate institutional, programmatic and operational risks.

As mentioned earlier, there is no formal process currently in place to identify infrastructure risks. By utilizing the existing systems of master planning and functional reviews, some of those risks will be identified. In addition, a process can be developed to integrate infrastructure risk identification into the reviews.

High-Impact Objectives

In a three-day Mission Support Implementation Plan (MSIP) workshop attended by 75 Center, Headquarters, and IPT representatives, participants were asked to prioritize all IPT objectives by assessing the Agency consequence of not achieving each objective in the following four areas:

1. Impact on Resources
2. Impact on Management Effectiveness/Efficiencies
3. External Implications
4. Future Sustainability of the Mission

In addition to this evaluation, all participants were asked to cast votes on the objectives they viewed as most critical to the Agency. As a result of these exercises, 24 of all IPT objectives were categorized as high priority and six of those 24 are Infrastructure IPT objectives. They are:

Objective IN-1B: Ensure the formal integration of institutional considerations into programs and projects from project inception to completion and final asset disposition to provide most effective support to mission.

Objective IN-1C: Prioritize and allocate infrastructure resources to balance optimal support of mission needs and externally levied requirements.

Objective IN-2A: Leverage and size assets, capabilities, and resources to meet mission needs, eliminate excess capacity, and scale asset performance accordingly (SCAP).

Objective IN-2C: Transition shuttle infrastructure assets as appropriate, by developing and implementing disposition plans of unneeded assets to effectively and efficiently support the Vision for Space Exploration

Objective IN-3A: Integrate continuous risk management practices into the life cycle management of NASA's infrastructure to enhance mission support and sustainability.

Objective IN-3B: Enhance mission performance and reduce life cycle costs of operations, maintenance, and disposition of infrastructure assets to ensure maximum funding is available to mission programs and projects through sustainability design practices and the implementation of new technologies

While accomplishment of all of the IN-IPT sub-goals and objectives are important and necessary steps to improving the Agency's infrastructure, the objectives listed above were considered by a cross-agency team to have the highest negative consequence to the Agency if not achieved, and therefore were determined to be the most critical objectives to pursue in the short-term.

III. Performance and Accountability

Sub-Goal IN-1: Obtain mission needs by conducting joint planning early and throughout the lifecycle of program and projects.

Outcome:

Joint planning results in early identification of mission needs and plans for infrastructure and assets such that mission risks are minimized, externally and internally levied requirements are effectively addressed, and mission performance is enhanced.

Metric:

Participation in Phase A and all successive life cycle phases as defined by 7120.5.

Sub-goal IN-2: Ensure that infrastructure, assets, and capabilities are flexible, aligned, and configured to mission and available when needed.

Outcome:

Changing mission needs are met by infrastructure, assets, and capabilities that are available, capable and flexible.

Metric:

Timely and effective infrastructure asset availability to mission

Sub-goal IN-3: Implement risk mitigation and sustainability practices across the Agency’s infrastructure to prevent adverse mission impacts, protect mission resources, and enable the NASA mission to the fullest extent possible.

Outcome:

Future infrastructure risks to mission are mitigated through proactive deployment of sustainability practices.

Metric:

Level of infrastructure risk

IV. Issues and Risks

The following issues/problems are currently impacting the Agency's ability to fully achieve the high impact objectives defined in this White Paper.

Issue #	Issue/Problem Statement	Impact to IPT Plan	Remediation Approach
IN-I1	No formal process for obtaining requirements, plans, and needs for mission so that institutional considerations may be integrated.	Lack of effective and integrated process puts minimal risk by increasing the potential for institution-selected cost and schedule problems.	Develop and execute an integration process to insert institutional considerations into current program/project approval and execution processes. Use existing governance mechanisms, structures, and policies wherever possible
IN-I2	No formal methodology for prioritizing institutional requirements across the agency. No common understanding of definition for balancing priorities between mission and external requirements.	Lack of disciplined process leads to ad-hoc, inconsistent and ineffective decisions making.	Implement a portfolio approach to realigning the Agency's institutional base and balancing mission needs with external requirements.
IN-I3	No incentive for disinvestment of excess infrastructure at the level of execution.	Lack of incentive at the level of infrastructure owner (normally centers) hinders NASA's ability to achieve disinvestment goals.	Develop possible incentives and propose to Senior Management.
IN-I4	No formal process for integrating continuous risk management into life cycle of NASA's infrastructure.	Lack of methodical integration of continuous risk management into life cycle can impact cost and schedules.	Develop a formal process for integrating continuous risk management and propose to Senior Management.
IN-I5	Programs and Projects do not design for operations; short term focus instead of long-term focus.	Short-term focus increases the costs escalation in the operations phase.	Raise with Senior Management ideal solution is to require programs/projects to design for operations.

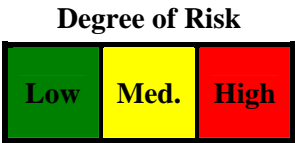
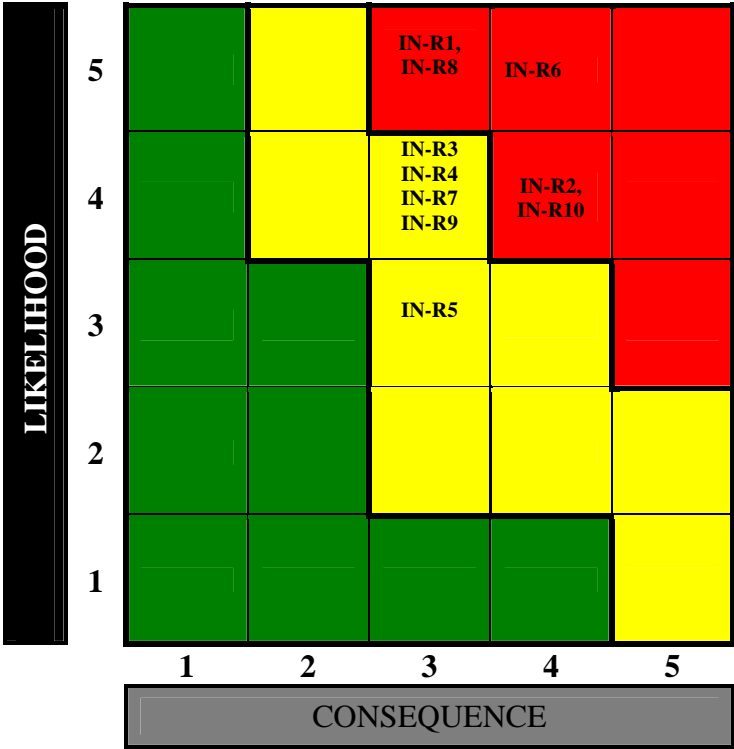
The following risks may prevent the Agency from fully achieving the goals, objectives and outcomes defined in this White Paper. Mitigation strategies for these risks are being developed and will be included in a future version of this white paper.

Risk #	Concern	Risk Statement	Criticality	Likelihood	Consequence
IN-R1	There is no formal process for obtaining requirements, plans, and needs for mission so that institutional considerations may be integrated.	Given that we have a lack of discipline there is a possibility that ad hoc planning will result in the misuse of resources.	High	5	3
IN-R2	There is no formal process for obtaining requirements, plans, and needs for mission so that institutional considerations may be integrated.	Given that the missions do not fully develop their requirements there is a possibility of not having infrastructure in place to support the mission.	High	4	4
IN-R3	There is no formal process for obtaining requirements, plans, and needs for mission so that institutional considerations may be integrated.	Given that the culture in the Agency is stovepiped, there is a possibility that the planning will not be integrated and remain parochial.	Medium	4	3
IN-R4	There is no formal methodology for prioritizing institutional requirements. No common understanding of how to balance priorities between mission and external requirements.	Given that NASA has three competing missions (making it difficult to determine which is a priority), there is a possibility that right-sizing decisions will be based on only one of the missions and will sub-optimize performance on the others.	Medium	4	3
IN-R5	There is no incentive for disinvestment of excess infrastructure at the level of execution.	Given that a complex set of Cultural and Historical preservation requirements exist involving multiple interest groups, there is a possibility that it will be difficult to dispose of assets in a proper and effective manner.	Medium	3	3

Risk #	Concern	Risk Statement	Criticality	Likelihood	Consequence
IN-R6	There is no incentive for disinvestment of excess infrastructure at the level of execution	Given that there is currently no transition budget, there is a possibility that the agency cannot maintain the required assets and capabilities for the mission.	High	5	4
IN-R7	There is no formal process for integrating continuous risk management into life cycle of NASA's infrastructure.	Given lack of familiarity of continuous risk management within NASA, there is a possibility that timely and effective implementation may not be achieved	Medium	4	3
IN-R8	There is no formal process for integrating continuous risk management into life cycle of NASA's infrastructure.	Given continuous risk management protocols are not in place, there is a possibility that risk management may not be effectively implemented	High	5	3
IN-R9	There is no formal process for obtaining training or resources needed to implement sustainable practices.	Given that there is a lack of training and resources to support knowledgeable use of new technology, there is a possibility that the Agency could fail to implement sustainable practices.	Medium	4	3
IN-R10	Programs and Projects do not design for operations; short term focus instead of long-term focus.	Given that current budget process focuses on initial costs, there is a possibility that higher cost of operations and maintenance could be diverted from other uses.	High	4	4

RISK ASSESSMENT

FIGURE 1.0



Appendix A

Secondary Risks to the Agency- Medium impact Objectives

The IN-IPT determined that there were two objectives that presented a medium level risk to the Agency if not done. Those two objectives, their risk statement, and risk profile are presented in this appendix.

The following Objectives were identified as having a Medium Impact to the Agency:

***Objective IN-2B:** Ensure that institutional systems and infrastructure are resilient, flexible, and adaptable to meet changing mission needs.*

***Objective IN-3C:** Reduce the cost of energy and increase resiliency of energy supplies for facilities and transportation operations through the use of alternative energy technology and capabilities*

Objectives, Risk Statements, and Risk Profile:

***Objective IN-2B:** Ensure that institutional systems and infrastructure are resilient, flexible, and adaptable to meet changing mission needs.*

Risk Statement: Given that historically we have built single use/ mission facilities, then we will reduce NASA missions. (2/3)

***Objective IN-3C:** Reduce the cost of energy and increase resiliency of energy supplies for facilities and transportation operations through the use of alternative energy technology and capabilities.*

Risk Statement: Given that energy costs are constantly rising and the aging infrastructure is unreliable, then the increasing costs will erode resources available to mission. (4/3)

Appendix B

Acronyms and Definitions:

Business Management Division (BMD): The HQ Business Management Division provides a wide range of activities including: budget formulation and execution of Corporate Management and Operations (CMAO) functions of the Agency Corporate G&A budget; funds control for the CMAO functions; budget management support to HQ Operations and multiple Mission Directorate and Functional Support Office customers of the CMAO function; support implementation of e-Gov, IEMP, and OCFO budget system and process initiatives; operations support for installed business and administrative systems; interface with the MSFC Competency Center, the GSFC Regional Finance and Procurement Offices supporting HQ Operations, and the NAA Shared Services Center

Critical Infrastructure Protection: The protection of systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.

Construction of Facilities (CoF): A congressional appropriation which provides funding for the revitalization projects (repair, rehabilitation, and modification of existing facilities); the construction of new facilities; the acquisition of related collateral equipment; environmental compliance and restoration activities; the design of facilities projects; and advanced planning related to future facility needs.

Cost Estimate: The life-cycle costs of a program or project from inception to disposition/termination.

Emergency Preparedness: The discipline which ensures an organization's readiness to respond to an emergency in a coordinated, timely and effective manner.

Encroachment: Encroachment on NASA Centers by the surrounding community limits NASA's ability to perform Mission. E.g. elevated noise levels limit times when we can perform tests, proximity to homes/offices limits our use of certain chemicals.

External Requirements: Requirements, laws or regulations placed on the Agency that do not originate within the Agency.

Facility Condition Index (FCI)- An assessment of the general condition of all facilities and an estimate of deferred maintenance (or recapitalization) costs using a parametric estimating method. The method is designed to provide consistent, auditable deferred maintenance estimates at the Agency and Center levels, and to provide an assessment of the general condition of facilities at the system and facility level.

Infrastructure: A collection of assets.

Institutional Base: The human resources, real property, facilities, aircraft, personal property, equipment, information technology resources and administrative and program support services (e.g. environmental management) required to support programs and projects.

Life-cycle Cost: The entire cost of a program/project from inception in the formulation subprocess to completion in the implementation subprocess to ultimate disposition/termination of the program/project.

Mission Support Offices (MSO's): Headquarters organizations that establish and disseminate policy and leadership strategies within assigned areas of responsibility in support of all NASA programs and activities. The MSOs maintain sufficient insight into program activities to ensure that NASA programs are conducted in accordance with all statutory, regulatory, and fiduciary responsibilities. The MSOs also play a critical role in looking at the Agency's long-term program requirements and setting mission support strategies to address them.

The NASA Headquarters MSOs covered by the Mission Support Implementation Plan include:

- Office of Safety and Mission Assurance
- Office of the Chief Engineer
- Office of Program Analysis and Evaluation
- Office of the Chief Financial Officer
- Office of the Chief Information Officer
- Office of the General Counsel
- Office of the Integrated Enterprise Management Program
- Office of Security and Program Protection
- Office of Institutions and Management
 - Aircraft Management Division (AMD)
 - Environmental Management Division (EMD)
 - Facilities Engineering and Real Property Division (FERD)
 - Logistics Management Division (LMD)
 - Management Systems Division (MSD)
 - Shared Capability Division (SCAP)
- NASA Shared Services Center
- Office of Human Capital Management
- Office of Infrastructure and Administration
- Office of Diversity and Equal Opportunity
- Office of Procurement
- Office of Small and Disadvantaged Business Utilization
- Office of the Chief of Strategic Communications
- Office of Education
- Office of External Relations
- Office of Legislative Affairs
- Office of the Chief Health and Medical Officer
- Office of Public Affairs
- Office of Communications Planning

NASA Strategic Plan: The Strategic Plan documents the agency's long-term goals, articulated in a coherent plan that establishes the framework under which NASA may achieve its vision "to advance U.S. scientific, security, and economic interests through a robust space exploration program."

Programs, Projects, Budget, and Execution: An agency-wide methodology for aligning resources in a comprehensive, disciplined, top-down approach that supports the agency's vision and mission. It focuses on translating strategy into actionable programs and bringing together agency priorities and strategic outcomes within the agency's resource constraints.

Resiliency: The characteristic of a system's ability to recover back to a reference state (e.g. natural state) after a disturbance and the capacity of a system to maintain its structures and functions despite disturbance.

Risk Management: An organized, systematic decision-making process that efficiently identifies, analyzes, plans, tracks, controls, communicates, and documents risk to increase the likelihood of achieving program/project goals.

Shared Capability Asset Program (SCAP): A program designed to ensure that key capabilities and assets are available to support NASA's mission. The SCAP involves identifying and prioritizing critical NASA assets and making strategic investment decisions to replace, modify, or dispose of such assets based on NASA and national needs.

Sustainable Practice: An overarching concept incorporating appropriate practices, techniques and tools that provide for NASA to have sufficient resources to accomplish its Mission today without jeopardizing the ability for NASA to accomplish its Mission in the future. Within the institutional base it includes: sustainable design, decommissioning to enhance and balance facility life-cycle, energy efficiency, minimize footprint, etc. Sustainability requires a practical and balanced approach to responsible stewardship of our natural, human, and financial resources.

Vision for Space Exploration: NASA's plan to implement an integrated, long-term robotic and human exploration program structured with measurable milestones and executed on the basis of available resources, accumulated experience, and technology readiness.

6.3 Integrated Product Team (IPT) White Paper – Finance

Finance IPT Owner: Deputy Chief Financial Officer (CFO)

Point-of-Contact for White Paper: Pam Cucarola

Overview

NASA's financial position and health play a vital role in the Agency's mission and its ability to realize the Vision for Space Exploration. The Agency's financial position and health are defined by its ability to present budgets that effectively represent NASA's goals and program requirements, achieve goals within budget and schedule parameters, control operating costs, and account for the financial resources it uses. The American public's ongoing commitment and support of NASA's mission is essential to its success and depends upon our ability to deliver timely, accurate, and credible financial and performance information that clearly demonstrate how NASA has used its resources. Internally, program and project managers must have accurate, reliable, and timely data for decision-making. Costs and efficiencies must be proactively managed through analyses that yield improvements.

The Finance Integrated Product Team (IPT), through this White Paper, will guide NASA in improving the management of its financial resources, establishing goals and objectives for providing relevant financial information, sharing financial knowledge, and providing financial expertise to NASA's management and scientific communities. The white paper calls for the Agency to continue to invest in its people, ensuring that they have the skills and knowledge required to provide leadership in areas critical to NASA's Vision: cost estimation and analysis, budgeting, financial analysis, and reporting.

I. IPT Scope

The functional areas within the scope of the Finance IPT (FIPT) include the Office of the Chief Financial Officer (including Center finance and resources offices), Program Analysis and Evaluation (PA&E), the Integrated Enterprise Management Program (IEMP) Office, the Office of Institutions and Management (OIM), including Procurement and Infrastructure and Administration (I&A). The specific functions within I&A include Facilities, Real Property, Aircraft, Environmental, Logistics, and Corporate Headquarters management.

In addition, there are important cross-organizational functional areas that contribute to Finance IPT goals and objectives. These functional areas or offices include the Office of the Chief Engineer and the Office of the Chief Information Officer (support of IT Infrastructure).

The FIPT functional areas described below are an integration of the various responsibilities associated with ensuring the Agency's financial health. These functions represent multiple processes, activities, and systems whose alignment is necessary to continuously improve NASA's financial management, and ensure that the Agency has the information and analyses to support effective decision-making and resource optimization. Financial integrity impacts all aspects of NASA operations and achieving it will require action from Centers, Mission Directorates, programs, projects, and Mission Support Offices. The functions include:

- a. Accounting: Control, execute, account for, and report on all Agency financial resources. Ensure Agency compliance with Chief Financial Officers Act, Government Performance and Results Act, Government Management Reform Act, Federal Financial Management Improvement Act, Economy Act, Federal Managers Financial Integrity Act; and Office of Management and Budget and Department of Treasury policies and guidance.
- b. Budgeting: Agency programmatic policy formulation, budget formulation, justification, and execution, including analysis, performance measurement and reporting activities. Leads the development and production of all resources related plans and reports, including Strategic Planning Guidance (SPG), Program Decision Memorandums (PDM), the Integrated Budget and Performance Document (IBPD), Operating and Phasing Plans, and the Performance and Accountability Report (PAR).
- c. Strategic Analyses: Portfolio, institutional and Directorate program performance assessments on the basis of cost, schedule, risk and commitments. Conduct external environmental analyses to align NASA's investment posture with technical capabilities in industry. Establish Agency-level goals for cost/efficiency performance improvements.
- d. Cost Estimating: Independent cost estimating and analysis of Agency projects in formulation (and in implementation when warranted by significant project changes or problems during implementation).

II. Sub-goals and Objectives

Financial sub-goals and objectives were developed to support Agency-level financial management requirements. Defined as part of the overall Mission Support Implementation Plan (MSIP), these requirements link to the overall mission support goals and requirements, and were provided to the FIPT as a foundation for its planning.

The requirements are:

1. Budget Stability and Alignment: The funds are available to the Agency to finance the missions and resource allocation is properly aligned with Agency strategic direction.
2. Finance Effectiveness: Managers are accountable for effective resource use and conservation, including implementation of cost savings measures and full leveraging of budgets and resources.
3. Financial Management System Effectiveness: Policies, practices, procedures and tools assure that accurate financial data, information, and records are available in a timely manner for effective decision-making.

In support of these requirements, the FIPT goals and objectives ensure that the Agency will continue to improve its overall financial management system. That system will facilitate long-term financial planning, translate that planning into sound resource and budget decisions, and improve program and institutional performance through monitoring and performance measurement, disciplined cost management, and improved decision-making supported by accurate, reliable, and timely financial data.

The following sub-goals, objectives, performance measures, issues and risks were developed to improve existing financial management system components and fill any that are missing.

Sub-Goal FI-1: Ensure effective financial planning to meet the Agency's long-term mission requirements.

With the NASA Authorization Act of 2005, Congress affirmed the Vision for Space Exploration and the course that President Bush set for us to advance our Nation's economic, scientific, and security interests as core components of NASA's mission. The Vision for Space Exploration establishes a bold new framework and challenge for the Agency's future, outlining a "building block" strategy that will enable us to explore scientifically valuable destinations across the solar system in a "sustainable, affordable, and flexible manner."

Given the highly complex nature of NASA's work and the uncertainty surrounding research and development projects, especially those related to robotic and human spaceflight, the Agency may not be able to control all variables impacting its path forward. The Agency can, however, plan for success and mitigate potential negative impacts through disciplined strategic planning that includes financial resource planning as a core component.

Objective FI-1A: Implement a process for assessing long-term financial resource needs, relative to Agency long-term mission plans.

The Agency will develop a long-term financial planning process fully aligned with the existing strategic planning process. The process will integrate all financial resource variables, institutional, programmatic, and human capital, to develop a holistic understanding of the financial resource requirements related to achieving the mission. To address the inherent uncertainties of space exploration and research, cost estimating and scenario planning techniques will be employed. These techniques will consider a range of future possibilities and outcomes that, reflected in long-term financial resource projections, help to improve their fidelity.

Objective FI-1A: Assess and manage the risks to mission arising from inherent uncertainty of projected long-term financial requirements.

The long-term financial planning process will likely illuminate multiple financial risks to mission. In keeping with the Agency's overall approach to risk management, these risks will be formally documented, assessed and managed. This process will help to ensure the availability of financial resources required to sustain the mission over the long-term.

Sub-Goal FI-2: Align financial resources to the Agency's strategy.

The alignment of financial resources to plans builds a link between the Agency's long-term (10+ year) planning, its mid-term (2-10 year) plans and securing the funds for the near term (1-4 years). It is one of the clearest and most visible expressions of both the Agency's commitment to

its mission, and the fundamentals – how funds will be used – intended to achieve those plans. It demonstrates to the President, the Congress and the public the Agency’s direction and priorities. The quality and clarity of that alignment provides the basis for explanation and defense of the Agency’s budget requests.

The Agency’s Planning, Programming, Budget and Execution (PPBE) process strengthens the alignment between the Agency’s mission strategy and the financial resources required to support it. The Agency will continue to improve the implementation of the PPBE process, clearly linking programmatic strategy to budget components, and translating the results into a budget request that provides a clear, comprehensive picture of how the Agency intends to use those resources to execute its strategy. To further align resources and strategy, the Agency intends to improve its funds distribution process, simultaneously accelerating access to funds while strengthening the controls that ensure resources are distributed in keeping with Agency commitments.

Objective FI-2A: Align Agency planning and budgeting requests to clearly and comprehensively support mission requirements.

The PPBE process is the Agency’s primary mechanism for aligning the budget with the Agency’s strategic plan. This is accomplished, in the PPBE process, through the issuance of strategic guidance to budget developers, analysis of the resulting budget requests, and through “trade-off” decisions made in the allocation of funding to programs/projects. NASA will continue to improve the integration of programs and projects and their alignment with the Agency’s mission. Improved fidelity of NASA’s 2-5 year planning and programming estimates will help programs and projects to estimate and stabilize their technical and related funding requirements. This, in turn, will improve the ability of the Agency’s institutional management to forecast infrastructure requirements. Stability and clarity in direction (planning) and decision-making (budgeting) are critical components for building an integrated Agency perspective on what is required financially to support mission requirements.

Objective FI-2B: Execute Agency funding decisions in a manner consistent with approved Agency mission and institutional plans.

Once funding decisions are solidified through the Agency’s budget and Operating/Execution/Phasing Plans, the execution of those decisions becomes a balance between planned activity and changes that have emerged since budgets were defined. The Agency will evaluate changes, as they impact mission requirements, and determine appropriate steps to keep Agency funding consistent, to the extent possible, with emerging needs. Analysis of Agency spending will help to determine the effectiveness of both the distribution of funds to programs, projects, and institutions (speed and accuracy of the distribution of funds) and the use of those funds by those parties to achieve mission goals.

Objective FI-2C: Balance optimal support of mission and institutional needs with externally levied requirements on the financial management system.

NASA develops plans and related budgets to achieve its mission requirements. Other requirements which consume financial resources are also levied on the Agency by external

organizations, such as OMB and Congress. These requirements must be balanced so that, to the extent possible, NASA can accomplish them without major financial impact to any of its core programs.

As Government Accountability Office (GAO), independent financial, and agency internal audits yield recommendations for improving the systems and processes that deliver financial data, the Agency will implement these recommendations in an appropriate and timely manner. Prioritization of recommendations and timelines for implementation will be determined foremost by any impact to mission. Once priorities are established, the organizations most impacted will reach a common understanding of audit recommendations and will agree upon a common integrated approach for addressing them.

Sub-Goal FI-3: Maximize funding for the mission.

The Agency must optimize its financial resources allocated to direct mission program and project activities. In support of this sub-goal, the Agency will assess whether Agency financial resources are appropriately employed to support program technical goals as planned, and determine if adjustments are required. The Agency will also implement cost management programs aimed at improving operating efficiencies and redirecting resources, as appropriate. Lastly, the Agency will ensure internal controls contribute to process efficiency and safeguard resource use.

Objective FI-3A: Evaluate Agency budget and spending in terms of mission performance to gauge whether expected results are being achieved and to focus improvement efforts.

The Agency will regularly monitor program, project and institutional spending to ensure that financial resources are consumed according to plan and in a manner that contributes to the accomplishment of Agency goals and objectives. Spending plans will be adjusted where necessary to account for emerging needs, changes to project approach or schedules, and changes to Agency priorities.

Objective FI-3B: Implement Agency cost management programs to improve mission and mission support operating efficiency and optimize funds available to the mission.

Agency cost management programs will be developed to optimize funds available to the mission. These programs will emphasize conservation and sustainable processes wherever possible. The intention of these programs is to support long-term mission viability by deploying financial processes, techniques and/or innovations that meet today's requirements without compromising the ability to meet future needs.

Objective FI-3C: Embed effective internal controls in all Agency financial management processes and practices.

Internal controls provide an important mechanism for achieving and sustaining effective financial management practices. Built into our processes, these controls will help ensure that work is accomplished consistent with effective financial management principles. Throughout, the Agency will examine the balance between process control and process efficiency.

Sub-Goal FI-4: Provide reliable, accurate, and timely financial resource information for decision-making purposes.

The American public's ongoing commitment and support of NASA's mission depends largely on the Agency's ability to wisely employ its resources and to demonstrate the same. Both the ability to wisely use resources and to demonstrate such use, require timely, accurate, and reliable data.

The effectiveness of the Agency's program, project and institutional managers is also largely reliant upon the financial information they are provided. NASA's unique relationships with its contractors make the ability to track and project costs a critical competency of its project managers. Additionally, high quality information related to budgets and spending becomes even more important as the Agency adopts the principles and practices of Earned Value Management.

Objective FI-4A: Standardize Agency financial management processes and procedures.

Standardization helps ensure data accuracy, reliability and timeliness. It fosters a common understanding of the data, and it provides for the application of common Agency definitions of financial resource concepts. Each of these elements must be in place to make effective use of financial resource information at an Agency level. While Center-unique differences will be considered in developing and implementing standard process and procedures, the Agency will continue to emphasize and promote the standardization of financial language, policies, processes and reporting.

Objective FI-4B: Provide effective financial and resources management information systems and reporting tools.

The Agency will build management information systems and reporting tools that enable efficient access to, and robust analysis of, financial resources information. In developing these systems and reporting tools, externally mandated systems and reporting requirements will be balanced with Agency's mission requirements to ensure that external requirements are not fulfilled at the expense of the Agency mission.

Objective FI-4C: Integrate financial information systems, processes, and data with other Agency (HR, Procurement, etc.) information systems, processes, and data.

Currently, Agency data is largely compartmentalized and made available along functional lines. This makes it difficult for Agency decision-makers to make decisions with a full understanding

of their impact on all variables affecting performance. Additionally, systems, processes, and data compartmentalization contributes to redundant and misaligned processes, ultimately affecting Agency operating efficiency. Integrating systems and process will facilitate improved decision-making and operating efficiency.

High-Impact Objectives

In a three-day Mission Support Implementation Plan (MSIP) workshop attended by 75 Center, Headquarters, and IPT representatives, participants were asked to prioritize all IPT objectives by assessing the Agency consequence of not achieving each objective in the following four areas:

5. Impact on Resources
6. Impact on Management Effectiveness/Efficiencies
7. External Implications
8. Future Sustainability of the Mission

In addition to this evaluation, all participants were asked to cast votes on the objectives they viewed as most critical to the Agency. As a result of these exercises, 24 of all IPT objectives were categorized as high priority and six of those 24 are FIPT objectives. They are:

- FI-1A: Implement a process for assessing long-term financial resource needs, relative to Agency long-term mission plans.
- FI-2A: Align Agency planning and budget requests to clearly and comprehensively support mission requirements.
- FI-2B: Execute Agency funding decisions in a manner consistent with approved Agency mission and institutional plans.
- FI-3C: Embed effective internal controls in all Agency financial management processes and practices.
- FI-4B: Provide effective financial and resource management information systems and reporting tools.
- FI-4C: Integrate financial information systems, processes, and data with other Agency (HR, Procurement, etc.) information systems, processes, and data.

While accomplishment of all of the FIPT sub-goals and objectives are important and necessary steps to improving the Agency's financial management system, the objectives listed above were considered by a cross-agency team to have the highest negative consequence to the Agency if not achieved, and therefore were determined to be the most critical objectives to pursue in the short-term.

III. Performance and Accountability

Working jointly to meet these sub-goals and objectives, the Agency expects to achieve the following outcomes:

1. NASA produces accurate and timely financial information (FI-2.1):
 - a. Known data integrity issues impacting confidence in financial data resolved by Q1 FY 2007
 - b. Deliver greater visibility into actual versus estimated program and project cost by Q1 FY 2007
2. By Q2 FY2007, NASA establishes and begins ongoing monitoring of performance against budget plans and funds distribution alignment with those plans. (FI-2.2)
3. By Q1 FY 2008, NASA establishes, and begins on-going monitoring, of key financial and cost indicators and targets. (FI-3.1)
4. By Q1 FY 2010, NASA established cost management targets and associated baselines. (FI-3.2)
5. By Q1 FY 2009, NASA has a baseline of the cost of program performance for all programs. (FI-3.3)
6. By Q1 FY 2009, NASA receives an unqualified audit opinion on its annual financial statements. (FI-4.1)
7. By Q3 FY 2009, NASA receives the Association of Government Accountants' Certificate of Excellence in Accountability Reporting (CEAR) Award for quality and clarity of its Performance Accountability Report. (FI-4.2)
8. By Q1 FY 2010, NASA achieves improved financial management as measured by a green rating on the President's Management Agenda for Financial Management Improvement. (FI-4.3)

IV. Issues and Risks

The following issues or problems are currently impacting the Agency's ability to fully achieve the goals, objectives and outcomes defined in this White Paper.

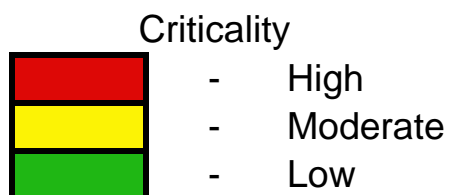
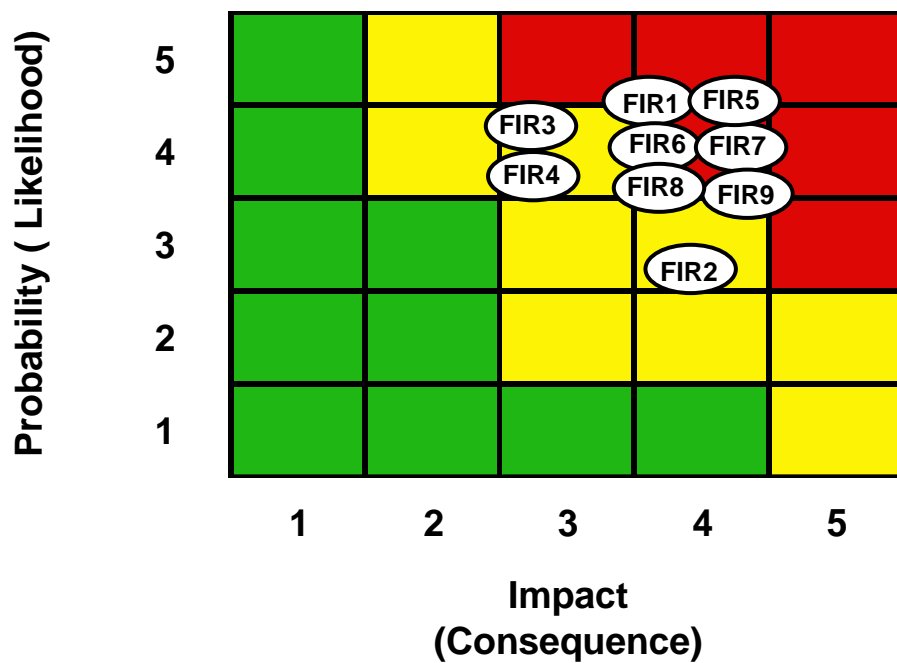
Issue #	Issue/Problem Statement	Impact to IPT Plan	Remediation Approach
FI-I1	Unable to build and maintain Agency-wide support for budgetary, financial management and efficiency improvements. (FI-I1)	Further improvement initiatives may not be accepted or supported.	FIPT will develop an integrated communications and change management strategy aimed at further embedding resource and financial accountability in the Agency culture. FIPT will work with the SMC and OMC to ensure that this work is prioritized within the Agency to ensure that all levels of NASA management recognize the importance of financial management improvement.
FI-I2	Challenges in integrating and aligning budgetary and financial management processes across Procurement, PA&E, Institutions and Management, Chief Engineer's Office, and OCFO. (FI-I2)	Financial management improvements require that budgetary and financial management processes (from strategic planning to cost estimating to budgeting to procurement to asset management to financial analyses and reporting) be integrated in order to improve the Agency's overall financial position.	Beginning with Property, Plant and Equipment and the implementation of the Planning, Programming, Budget, and Execution processes which are already underway, the Agency, through the FIPT, will regularly engage all appropriate functions in improving NASA's overall financial management capabilities.
FI-I3	Inability to prepare robust programmatic and institutional budget analyses given current skills and staffing level. (FI-I3)	Poor quality analyses may lead to inaccurate conclusions and eventually uninformed decision-making.	Develop and execute a workforce development plan that builds bench strength for the long-term. In the short-term, gain agreement on highest priority analyses so that resources can be appropriately focused. Ensure role clarity across functions supporting financial and budgetary management to avoid duplication of efforts.

The following risks may prevent the Agency from fully achieving the goals, objectives and outcomes defined in this White Paper. Mitigation strategies for these risks are being developed and will be included in a future version of this white paper.

Risk #	Concern	Risk Statement	Criticality	Likelihood	Consequence
FI-R1	Impact of scientific and technology uncertainty (FI-1A)	Given the uncertain nature of NASA's work and multiple unknown programmatic variables, there is a possibility that long-term financial planning cannot be conducted with a high degree of confidence in the output	High	4	4
FI-R2	Reliability of cost-estimates incorporated in long-term financial planning (FI-1A)	Given that the Agency is still improving its cost estimating capability, there is a possibility that cost estimates used as a data source for long-term financial planning are not reliable, impacting the quality of long-term financial planning	Moderate	3	4
FI-R3	Inability to build long-term Agency support for long-term financial planning (FI-1A)	Given that political volatility often impacts Agency direction, there is a possibility that participants in the long-term planning process perceive it to be a waste of time, impairing commitment to the effort	Moderate	4	3
FI-R4	Unforeseen / Unfunded Federal Mandates (FI-2A)	Given the high and growing number of federal mandates, there is a possibility that Agency funds will be diverted from the mission, causing program sub-optimization or delays	Moderate	4	3
FI-R5	Ineffective and inefficient internal controls implementation (FI-3C)	Given that there is not adequate cross-functional integration with respect to internal controls implementation, there is a possibility that improvements to internal controls will be inefficiently and ineffectively implemented	High	4	4
FI-R6	Internal controls implemented but	Given that the Agency does not fully understand internal controls, there is	High	4	4

	ineffective (FI-3C)	a possibility that the internal controls implemented won't be effective			
FI-R7	Inability to implement effective financial resource management systems and tools (FI-4B)	Given that NASA HQs has failed to enforce standards and requirements for specific tools and approaches, there is a possibility that inconsistencies in approaches may result in increased cost and schedule slippages when implementing new systems and tools	High	4	4
FI-R8	Inability to implement effective financial resource management systems and tools (FI-4B)	Given that Centers and Mission Directorates highly value independence and autonomy there is a possibility they will continue to develop organization-unique tools for common functions, increasing costs and decreasing effectiveness of Agency-level financial systems and tools	High	4	4
FI-R9	Inability to integrate finance systems, processes, and data with other functionally compartmentalized systems, processes, and data (FI-4C)	Given that functions do not always share a common definition of key terms or concepts, there is a possibility that the lack of a common definition will impede cross-functional integration	High	4	4

RISK ASSESSMENT



6.4 Integrated Product Team (IPT) White Paper – Information Systems

Information Systems IPT Owner: NASA Chief Information Officer
Point of Contact for White Paper: Gary Cox

Overview

The strategic management of information and information technologies will be imperative to realizing the Vision for Space Exploration. Effectively managing, preserving, protecting, and disseminating the information required in achieving and resulting from exploration is vital to mission success. Therefore, NASA will plan, design, implement and manage programmatic and institutional information systems and services that enable NASA's mission and institutional objectives, and in doing so, will meet the Agency's internal and external information needs, conforming to the most appropriate and feasible standards of security and information management, with the fewest number of systems possible.

To achieve the objectives for the strategic management of information and information technology as defined in the 2006 NASA Strategic Plan, NASA will:

- Evaluate the Agency's information solution and service needs required for mission success against the current state by using the NASA Enterprise Architecture, identify any gaps, and formulate concepts and opportunities to fill the gaps;
- Apply best practices and portfolio management in the selection of initiatives and projects for information solutions and services that best meet NASA's priorities within resource constraints;
- Ensure cost, schedule, and performance success of initiatives and projects for information solutions and services by applying Agency policies and best practices for program and project management; and
- Protect the confidentiality, integrity, and availability of information and information systems based on the categorization of the information processed by, or stored within, NASA's information systems.

The entire NASA organization plays a role in ensuring that information assets are acquired, managed and utilized consistent with Federal policies, procedures, and legislation, and that the Agency's \$2.2 billion annual expenditures and investments in mission and institutional information systems are in alignment with NASA's Vision, Mission, and Strategic Goals. Moving forward, NASA must ensure that information system investments are made within an Agency-wide context of priorities, with mission alignment, and in a secure and cross-Center interoperable environment. These investments must bring NASA closer to our desired Agency architecture (one that is more easily defended, more cost-effective, and more service-oriented), rather than optimized at a project or Center level at the expense of overall Agency efficiency. The NASA Enterprise Architecture and supporting policies and procedures are critical for moving the Agency from its current state to the identified target architecture.

I. IPT Scope

In some form or fashion, information systems are utilized by nearly all NASA employees and contractors in the conduct of NASA's "business." Therefore, the sub-goals and objectives identified herein affect the entire Agency. The scope of this white paper encompasses the full spectrum of general purpose information systems and services across the Agency. The Agency classifies information systems under three portfolios, 1) Office Automation Information Technology (OAIT), 2) Multi-Program/Project (MP), and 3) Program Unique (PU). The scope of this IPT is the OAIT portfolio.

OAIT includes information systems that provide general purpose computing (e.g., e-mail and calendaring, desktops, help desk services, business applications, etc.) for both civil servants and contractor personnel, regardless of the program or project supported, or fund source. There are three service areas and nine portfolio elements within the OAIT portfolio.

Service Area	Portfolio Element
Communications	Wide Area Network
	Local Area Network
	Voice Communications
	Video Communications
Electronic Work Environment	Desktop Hardware and Software
	Messaging and Collaboration
Computing	Data Centers
	Public Web
	Applications

Embedded within the scope of the Information Systems IPT and the above portfolio elements are:

- The operational elements of providing enabling information systems and services to end users in a cost effective manner;
- Investments in new initiatives to reduce costs, improve Agency operations and productivity, and otherwise enable the NASA mission, while ensuring those investments are prioritized, controlled and managed to meet cost, schedule and performance commitments; and
- Ensuring the appropriate confidentiality, integrity, and availability of the information and systems through risk-based IT security controls, privacy protection policy, and sound records management practices.

Sub-goals and objectives of this white paper were derived from multiple interactions with the Division Heads in the Office of the CIO, the NASA Mission Directorate and Center Chief Information Officers (CIOs), the Office of Management and Budget, the General Accountability Office, the Integrated Enterprise Management Program (IEMP) Manager, Director of the IEMP Competency Center, NASA Integrated Services Network (NISN), and the Office of Security and Program Protection (OSPP). It is anticipated that goals, objectives, and budgets of multiple NASA organizations will map to the sub-goals and objectives herein, including the Office of the CIO (OCIO), OSPP, Office of Space Communications, IEMP, NASA Shared Services Center, Office of Human Capital Management, Office of Procurement, and all NASA Centers.

II. Sub-goals and Objectives

The IPT sub-goals and objectives that follow focus on three distinct areas of information systems: 1) Optimization of Operational Systems: systems in steady-state operations and the extent to which they are cost-effective and meeting NASA requirements; 2) Capital Investment and Planning Control: priority-based investments in information systems for development, enhancement, and/or modernization (DME) to provide new capability, improve existing capability, and/or reduce overall costs to the Agency through efficiencies or reduced life-cycle costs; and 3) IT Security: ensuring the confidentiality, integrity and availability of NASA's information and systems throughout its lifecycle.

Optimization of Operational Systems: NASA currently reports to the Office of Management and Budget (OMB) investments of over \$2.2 billion annually on information technology for general purpose and mission purposes. Approximately one-third of this amount is allocated for general purpose information technologies, or roughly \$700 million. Of this amount, 82 percent (\$574 million) is spent on information systems currently in steady-state operation. Many of these systems have been operational for many years and are now considered legacy systems. It is incumbent upon the Agency to evaluate these investments on a regular basis to ensure they are still required, are aligned with current operational and information requirements, and to assess opportunities for consolidation or other improvements to reduce operating costs. Even a 5 percent reduction due to efficiencies amounts to over \$25 million in potential savings annually for the Agency. Therefore, sub-goal IS-1 addresses the need to ensure operational systems meet NASA requirements in an optimal manner, as follows:

Sub-Goal IS-1: Ensure operational information systems and services meet NASA mission and institutional requirements in the optimal manner, considering and balancing resource constraints, external requirements, and mission priorities.

Objective IS-1A: Provide information and information technology solutions across NASA's portfolio elements that meet NASA's requirements in an optimal manner (centrally-managed/centrally-provided, centrally-managed/locally-provide, and/or locally-managed/locally-provided)

Objective IS-1B: Conduct periodic operational analyses to validate performance and mission alignment, and to identify opportunities for cost savings and performance improvements.

Objective IS-1C: Conduct joint planning with mission entities on current information system and services performance and future requirements.

Capital Planning and Investment Control: Approximately 18 percent of the general purpose information technology budget (\$126 million) is allocated to new investments to improve existing capabilities, reduce costs, or meet external requirements. When making these new investments, it is critical that they are prioritized according to Agency need and mission alignment, and that selected investments are controlled utilizing appropriate project management discipline to ensure success. It is imperative that complete and valid requirements are generated and traced to solution alternatives, and that there is appropriate confidence in, and subsequent execution within, the project baseline. The news media reports regularly on information technology projects that wasted millions of taxpayer dollars because appropriate project management discipline was not followed. NASA must ensure that each and every selected project for information systems is a success (completed on time and within budget, meeting customer requirements). Sub-goal IS-2 does not specify “what” new investments in information systems will be undertaken. Instead, IS-2 defines a framework for ensuring that the right investments are prioritized and selected based on alignment with a planned NASA Enterprise Architecture and information requirements, and are managed in a manner that ensures success, as follows:

Sub-Goal IS-2: Ensure new investments in IT systems and services are appropriately selected, controlled and evaluated based on Agency priorities and requirements.

Objective IS-2A: Develop and maintain the NASA Enterprise Architecture to document the current and target architecture for the Agency.

Objective IS-2B: Identify information and services gaps and overlaps, and develop/execute plans to ensure NASA has the proper information for decision-making, and proper services to conduct mission and institutional activities.

Objective IS-2C: Prioritize and select investments based on gap analyses, approved business cases and enterprise architecture reviews, balancing the optimal support of mission needs with externally levied requirements.

Objective IS-2D: Implement IT project investments, ensuring the use of NASA project management discipline and best practices, including independent reviews, to control project cost, schedule, performance and risk.

IT Security: One of the most critical aspects of owning and managing information systems revolves around the concept of ensuring the information is available when needed (even well into the future as is the case for many NASA missions), can be relied upon as accurate (vitally important for financial and scientific data sets), and is only disseminated to those people

authorized to view it (critical in the case of “sensitive but unclassified” information). In a nutshell, these are the goals of IT security and everyone at NASA has a role in ensuring the confidentiality, integrity and availability of NASA’s information.

There are five critical aspects that NASA must address immediately, as follows:

- Compliance with IT Security Laws and Regulations: Objective IS-3A is to ensure Federal Information Security Management Act (FISMA) requirements are incorporated throughout the lifecycle of information systems. This approach integrates security requirements and controls early in the information system planning and development process, rather than as a costly addition later, once the system has been deployed.
- Homeland Security Presidential Directive 12 (HSPD-12): Issued on August 27, 2004 as the Policy for a Common Identification Standard for Federal Employees and Contractors, HSPD-12 requires the issuance of “smart cards” to all Agency employees and contractors, and the use of the smart cards to control physical and logical access to facilities and information systems. The issue is complex and requires an integrated, yet cost-effective, infrastructure to be successful. Objective IS-3B provides the overarching basis for ensuring NASA mitigates the impacts and costs associated with managing identity, authorization, and access to information systems.
- Proactive Protection of Information and Information Systems: Threats and vulnerabilities to information systems are ever-changing and attackers are becoming increasingly more sophisticated in their methods. Objective IS-3C focuses on the continual assessment of information system vulnerabilities and employing appropriate tactics to harden systems against attack.
- Protection of Privacy Information: Various laws require NASA to ensure the privacy of information about employees, contractors and the public (within our systems) is appropriately protected from disclosure and misuse. Objective IS-3D will provide focus on measures to protect personally identifiable information, such as encryption, use of identifiers besides social security numbers, etc.
- Information Management and Availability: Much of NASA’s mission is about the information collected from programmatic activities. Information is the chief deliverable in many cases. A precursor to knowledge management is the requirement for information management and availability to ensure information collected today can be found and utilized well into the future. Objective IS-3E captures the concept of information management across multiple domains and ensuring its organization, usefulness and availability moving forward.

Therefore, Sub-Goal IS-3 comprises the domain of activities associated with confidentiality, integrity and availability of NASA’s information assets, as follows:

Sub-Goal IS-3: Ensure the confidentiality, integrity, and availability of NASA information and information systems based on the categorization of the information processed by, or stored within, the systems.

Objective IS-3A: Ensure information technology security is incorporated throughout the information system life-cycle.

Objective IS-3B: Reduce vulnerabilities and costs associated with managing identity, authorization, and access to NASA information systems

Objective IS-3C: Appropriately harden the NASA information infrastructure and systems against compromise of confidentiality, integrity and availability

Objective IS-3D: Ensure the appropriate protection and use of personally identifiable (i.e. Privacy) information.

Objective IS-3E: Manage NASA's information to enable appropriate dissemination and availability (public information, Scientific and Technical Information, program information, etc), and as a foundation for knowledge management.

High-Impact Objectives

During the Mission Support Implementation Planning Risk Workshop conducted November 7-9, 2006, representatives from various NASA organizations were allowed an opportunity to prioritize the sub-goals and objectives for the Information Systems IPT, and were asked to assess the consequences to the Agency of not meeting the objectives in the following four areas:

- 9. Impact on Resources
- 10. Impact on Management Effectiveness/Efficiencies
- 11. External Implications
- 12. Future Sustainability of the Mission

During this exercise, the following 5 objectives of the Information Systems IPT were identified by the overall group as priorities for the Agency:

1. Objective IS-1A: Provide information and information technology solutions across NASA's portfolio elements that meet NASA's requirements in an optimal manner (centrally-managed/centrally-provided, centrally-managed/locally-provide, and/or locally-managed/locally-provided).
2. Objective IS-1C: Conduct joint planning with mission entities on current information system and services performance and future requirements.
3. Objective IS-2B: Identify information and services gaps and overlaps, and develop/execute plans to ensure NASA has the proper information for decision-making and proper services to conduct mission and institutional activities.
4. Objective IS-2C: Prioritize and select investments based on gap analyses, approved business cases and enterprise architecture reviews, balancing the optimal support of mission needs with externally levied requirements.
5. Objective IS-3A: Ensure information technology security is incorporated throughout the information system life-cycle.

While accomplishment of all of the Information System IPT sub-goals and objectives are important and necessary steps to improving the Agency's information systems, the objectives listed above were considered by a cross-agency team to have the highest negative consequence to the Agency if not achieved, and therefore were determined to be the most critical objectives to pursue in the short-term.

III. Performance And Accountability

Outcome measures for sub-goals of the Information Systems IPT are as follows:

Sub-Goal IS-1: Ensure operational information systems and services meet NASA mission and institutional requirements in the optimal manner, considering and balancing resource constraints, external requirements, and mission priorities.

Outcomes:

IS-1.1 NASA information systems and services meet customer requirements

IS-1.2 Core information services are provided in the optimal manner (centrally-managed and centrally-provided, centrally-managed and locally-provided, or locally-managed and locally-provided) from multiple perspectives, including cost, compliance, and customers

Sub-Goal IS-2: Ensure new investments in IT systems and services are appropriately selected, controlled and evaluated based on Agency priorities and requirements.

Outcomes:

IS-2.1 New investments in IT systems are made based on Agency priorities

IS-2.2 Business cases for new investments identify return on investment, mission alignment, risk assessment, and an analysis of alternatives

IS-2.3 Projects to implement new investments in information systems follow NASA procedural requirements for program and project management

Sub-Goal IS-3: Ensure the confidentiality, integrity, and availability of NASA information and information systems based on the categorization of the information processed by, or stored within, the systems.

Outcomes:

IS-3.1 NASA information systems meet the requirements of the Federal Information Security Management Act (FISMA)

IS-3.2 NASA meets the milestone requirements of HSPD-12 and utilizes “smart-card” technology in a manner that better enables the mission

IS-3.3 NASA systems are resilient to attacks from intruders

IS-3.4 Personally identifiable information is not compromised

IS-3.5 NASA information is collected, stored and managed in a manner that enables appropriately robust use, reuse and longevity

IV. Issues And Risks

The following issues or problems are currently impacting the Agency’s ability to fully achieve the goals, objectives and outcomes defined in this White Paper.

IS-I1. Insufficient Center funding levels to support mission and institutional requirements appropriately. Performance levels are usually determined by, or are a result of, the amount of funding available for Centers to provide services. For instance, some Centers are pulling “seats” out of the ODIN contract in an attempt to save money. Whereas ODIN incorporates hardware and software refresh, patch management, asset management, etc. in the “seat” prices, moving seats out of ODIN usually results in systems that are not interoperable, not compliant with operating system configuration benchmarks, vulnerable to intrusion, etc. As well, when organizations pull seats out of ODIN, fixed costs of the program must be spread across and absorbed by a smaller sector, increasing costs to the organizations that remain. Strategically, NASA must decide the appropriate model for providing IT services across the Agency (considering all appropriate factors such as asset management, IT security, cost, customer satisfaction, etc) and then execute that strategy. (IS-1)

IS-I2. Difficulty in achieving seamless collaboration between Centers on some projects. In some cases it is very difficult for cross-Center collaboration to occur due to differing firewall rule sets, trust relationships, and inconsistent LAN architectures. A NASA virtual private network between Centers should be established to better-enable cross-Center and Agency applications and collaboration. (IS-1)

IS-I3. At some Centers, the bandwidth on the Center LAN is not sufficient to support some projects effectively. Centers need to upgrade networks where necessary to meet project requirements. (IS-1)

IS-I4. There are well over 3,000 public facing websites at NASA, many of which are potential holes into NASA’s IT infrastructure and also place unnecessary demands on NASA networks. Many of these websites need to be migrated to the NASA portal infrastructure in order to improve IT security, reduce traffic on the NASA WAN and Center LANs, and to reduce system administration and security costs at the local level. (IS-1)

IS-I7. Business cases are not consistently developed for IT systems and prioritized against other proposed projects at the Agency level. This often results in developing a system that is a high priority for a particular organization, but a lower priority than other systems that are more urgently needed, but unfunded. All investments in institutional IT projects should go before the NASA Operations Management Council (OMC) for prioritization and selection. (IS-2)

IS-I8. Earned Value Management (EVM) is required by OMB to be used to control all IT projects for development, modernization or enhancement (DME). Agency project management tools and financial systems are needed to effectively meet this requirement. (IS-2)

IS-I9. There are over 600 NASA IT systems that must be certified and accredited in accordance with National Institutes of Standards and Technology criteria by October 1, 2007 in order for NASA to maintain compliance with the Federal Information Security Management Act (FISMA). This is not a trivial effort and will require reallocation of resources at the Center and Program level in order to recover from the current state of noncompliance. Center Directors and Mission Directorate Associate Administrators will need to hold owners of information systems accountable for meeting the October 1, 2007 deadline. The NASA Deputy Administrator will then need to hold Center Directors and Mission Directorate AAs accountable for meeting the requirements. Any system not compliant by October 1, 2007 will either need approval from the Deputy Administrator to operate under an interim authority for 6 months, or be decommissioned until a current Certification and Accreditation is conducted. (IS-3)

IS-I10. Per HSPD-12, NASA must issue smart cards to all employees and contractors by October 27, 2007 and begin using the cards for access to NASA systems. An infrastructure to issue and manage the cards, identity information, IT accounts, and directory services is necessary in order to meet the requirements of HSPD-12 in the most cost-effective manner. A concerted effort among the Program Executive for HSPD-12, Office of the CIO, Office of Security and Program Protection, Office of Human Capital Management, and Office of Procurement, as well as Center counterparts will be vital to the implementation of this capability. (IS-3)

IS-I11. The distributed nature of the information systems architecture and the current IT sourcing strategy of NASA makes it difficult to provide effective “defense in depth” throughout the Agency. This large scale distribution of information systems and management leads to great variation in implementation of patch management, operating system configurations, network monitoring, vulnerability scanning, intrusion detection, firewall configurations, Internet protocol (IP) address management, etc. NASA must develop an organizational framework, governance model, and service provisioning model that will ensure effective defense in depth. (IS-3)

IS-I12. There is limited capability and skill among the Agency to take appropriate measures to protect sensitive but unclassified information, especially personally identifiable information. This places sensitive data at considerable risk. The Agency must develop and implement policies, procedures, tools, and training to ensure this data is properly protected from unauthorized disclosure. (IS-3)

IS-I13. NASA generates and relies upon a great deal of information in the conduct of business for the Agency and the stockpile is ever-expanding. Most of this information is unstructured, making it difficult to find when needed, or to reuse as appropriate, often resulting in the

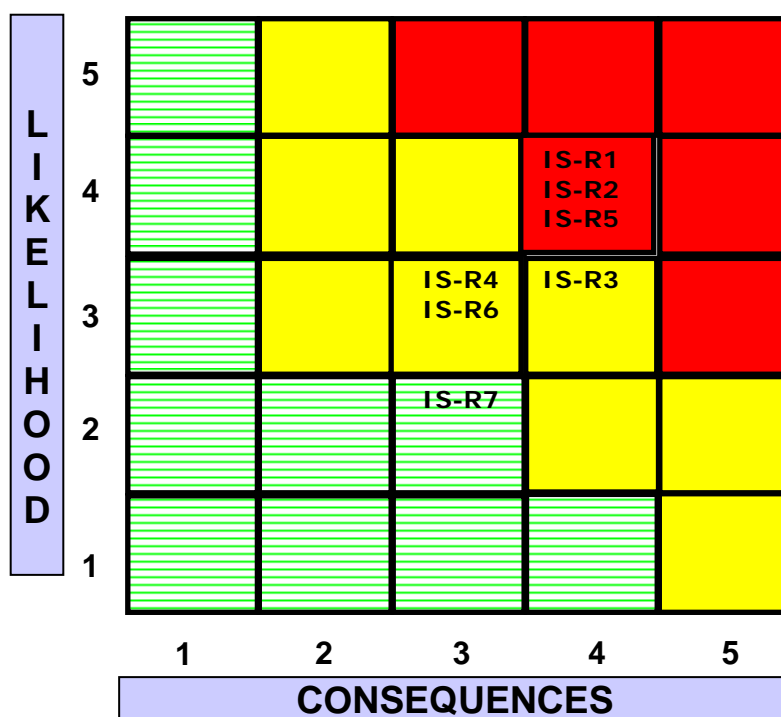
recreation of the information. NASA must develop an information management policy and procedures to address the meta-tagging, collection, storage, and reuse of information before the stockpile becomes too large. (IS-3)

The following risks may prevent the Agency from fully achieving the goals, objectives, and outcomes defined in this white paper. Mitigation strategies for these risks are being developed and will be included in a future version of this document.

Risk #	Concern	Risk Statement	Criticality	Likelihood	Consequence
IS-R1	Level of Center resources	Given that Centers must spread limited personnel and CMO funding across multiple areas, such as facilities, security, and information systems, there is a possibility that sufficient resources will not be available to meet customer satisfaction levels, FISMA compliance, and HSPD-12 milestones.	Moderate	4	4
IS-R2	Governance over information systems	Given the reliance on an extremely distributed model for providing information services, there is a possibility that the current governance model for information systems may not be appropriate for implementing and managing the objectives identified.	High	4	4
IS-R3	Unforeseen External Mandates	Given the dynamic nature of the federal information technology domain and OMB's role in overseeing E-Government, there is a possibility that Agency information system priorities may change substantially based on external factors, impacting the ability to focus and execute on the prioritized objectives identified herein.	Moderate	3	4
IS-R4	Prioritization and Commitment to Execution	Given the many activities in which the Agency is involved (everyone has too much to do), there is a possibility that many of the objectives may be overcome by other pressing matters at the organization level.	Moderate	3	3
IS-R5	Resistance to Change	Given that implementing many of the objectives will require significant change, there is a possibility that resistance to the change will hinder implementation.	High	4	4
IS-R6	Information Technology Workforce	Given the increasing complexity in managing information systems, protecting sensitive information,	Moderate	3	3

	Capabilities	and ensuring compliance with laws and regulations, coupled with Government-wide demand for talented IT workers, there is a possibility the Agency workforce may lack the skills and abilities required to execute the objectives.			
IS-R7	Over-reliance on single sources of technologies or services	Given the increased focus on providing core services in a centralized manner, there is a possibility the Agency may become overly reliant on a single technology, vendor or source, making it difficult to change to better alternatives in the future.	Low	2	3

RISK ASSESSMENT



Criticality	L x C Trend	Approach
High	⬇ Decreasing (Improving)	M - Mitigate
Med	⬆ Increasing (Worsening)	W - Watch
Low	↔ Unchanged	A - Accept
	□ New Since Last Period	R - Research

6.5 Integrated Product Team (IPT) White Paper – Management Systems

Management Systems IPT Owner: Associate Administrator for Program Analysis and Evaluation

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Overview

A management system can be defined as the set of processes, procedures, policies, tools and organizations performing the management functions of the Agency. There are multiple management systems at NASA including (not inclusive) the financial management system, the acquisition management system, the human capital management system, the information management system, the various infrastructure management systems, the program management system and the strategic management and governance system. The main functions of the management systems are to: 1) support decision-making, 2) provide a framework to conduct the operational activities of the agency and 3) allow management of Agency resources.

The financial management system, easily recognizable by most NASA entities, provides an example of a function-specific management system that focuses decision-making surrounding the financial resources of the agency. It provides a framework of the financial operations and allows the management of those finances. The latter two systems in the above list, the program management system and the strategic management and governance system, cross multiple functions and are highly dependent on the effectiveness of the various function-specific management systems. All of the management systems must work in concert to deliver on the mission, goals and objectives of NASA.

V. IPT Scope

The work of this Integrated Product Team (IPT) was to conceive what the Agency must do to remove current management systems deficits, improve processes and procedures to best manage the Agency's assets and activities, conduct business in an efficient manner, and facilitate decision-making to assure the most effective implementation of the Agency's missions. The foundation for the Agency to do so is set through accomplishing the sub-goals and objectives and addressing the issues and risks contained in this white paper.

This whitepaper addresses the integration and coordination of these multiple systems in to an effective and efficient "system of management systems". Integration of all of these management systems is key to: 1) reduce a duplication of efforts, hence staff time and dollars, 2) optimize decision-making and 3) identify unknowns that may impact the efficient and timely operations of the agency. In combination these management systems can: 1) produce decisions that are validated by all relevant parties and in the best interest of the Agency, 2) ensure good management of external and internal requirements to deliver on the mission in the most effective and efficient manner, 3) efficiently deal with systemic (cross-multiple systems) issues 4) ensure the most efficient NASA operations and business, and 5) ascertain the integrated performance toward the strategic directions and missions of NASA.

Further, this white paper focuses on the activities required to produce a framework for the description, monitoring, control and measurement of the efficiency and effectiveness of all the management systems and their integration. This framework will cross-cut and apply to all the Agency's management systems. It provides a common foundation for assuring that the Agency understands what is being provided by its management systems in support of the NASA mission. The activities to assure the effectiveness and efficiency of some function-specific management systems are dealt with in the other whitepapers within the Mission Support Implementation Plan.

In essence, the scope of this whitepaper encompasses the work of every Mission Support Office and their Center-level counterparts, and to date there is not a single organization that encompasses the whole of the "system of management systems". The integrated management system components are currently shared by the Office of Program Analysis and Evaluation (PA&E), the Office of Infrastructure and Administration (I&A) Management Systems Division, the Office of the Chief Engineer (OCE), the Office of the Chief Financial Officer (OCFO), the Office of the Chief Information Officer, Office of Program and Institution Integration (OPII) and the Integrated Enterprise Management Program (IEMP) Office. It is these organizations that will be relied on for the implementation of the sub-goals and objectives, in addition to addressing the issues and risks to achieve them.

VI. Goals and Objectives

Management Systems sub-goals and objectives were developed to support Agency-level management system requirements. Defined as part of the overall Mission Support Integration Plan (MSIP), these requirements link to the overall MSIP goals, objectives, and requirements, and were provided to the Management Systems IPT as a foundation for its planning.

The requirements are:

- 1) Strategic Management and Governance Effectiveness: the strategic management and governance system(s) elements are in place and operating effectively to produce decisions on current and future directions, monitor the progress toward this direction and provide course corrections due to underperforming or over-performing areas. Strategic management and governance activities produce the framework that guides the products of the management systems.
- 2) Operations/Business Process Execution Effectiveness and Efficiency: the management system(s) in place and effectively communicating and operating in an integrated manner to streamline the operations/business activities of the Agency. This is the business of managing the assets and performing key Agency support functions.
- 3) Internal Management Control: the policy, process and procedural controls are in place to assure that the management systems products support delivery on the Agency's goals and objectives. Involves:
 - a) Management systems are defined with clear boundaries and products so that their processes, policies, tools and organization is understood (provides a foundation for measurement of the effectiveness)

- b) Management systems deficiencies are understood and can be corrected.
- c) Organization structure that support effective controls and monitoring.
- d) Ongoing evaluations to determine the effectiveness of internal controls, including setting and tracking appropriate system performance metrics.

In support of these requirements, the Management Systems IPT (MSIPT) sub-goals and objectives ensure that the Agency will be successful at assuring the effectiveness and efficiency of its management systems and the products that they produce. The MSIPT sub-goals and objectives for the near-term timeframe focus on setting up the definition of the management systems, their boundaries and intersections, identifying deficiencies and gaps, and setting up the processes and actions to address these deficiencies and gaps. Little focus is placed on addressing deficiencies or gaps in any one system, but several known ones are addressed in the integration of the management systems. As the work is accomplished in the first two sub-goals, the results will add activities and objectives to this whitepaper for sub-goal MS-3. Further, the accomplishment of sub-goal MS-1 will assure for the long-term that deficiencies are tracked and dealt with on a continual basis.

Sub-Goal MS-1: Understand the components of the integrated agency management systems and implementing models to provide a baseline for measuring and improving the current processes, policies, procedures and tools.

The management systems of the Agency are highly complex systems and have many processes, personnel, policies, procedures and tools assigned to them. Each system has multiple internal and external requirements placed on it that shape the system content and definition. Further, each NASA Center may have a variation on each function-specific management system. This was especially apparent as the use of a new tool and processes were introduced for the financial management system several years ago. Due to the complex nature and the variations that may exist across the Agency, there is a lack of clarity on what the current management systems are comprised of, hence difficulty in identifying what gaps and deficiencies exist. Further, there has been no formal effort to look at them in an integrated manner to assess the interdependencies between systems and whether one system is receiving what it requires from another system to continue with its operations.

Objective MS-1A: Produce process and information (data) flow maps of the key discrete management systems.

The foundation to the integrated management system is the individual function-specific management systems. Each function-specific management system has a supporting set of policies, procedures, tools, personnel, data and products that are produced and that may intersect with another function-specific management system and definitely intersects with the strategic management and governance system or the program management system. The Agency will describe and document, i.e. create a model of, the aspects of these individual systems with their key controls and input requirements from other systems. The description will also include the process elements and data flows through the systems.

Objective MS-1B: Map the baseline, integrated system of management system architecture, including the interdependencies, intersections and combined products.

A mapping of the discrete management systems into a single integrated system of management systems will be baselined to record the key interdependencies and intersections among the systems. This mapping will depict how the combined products of each discrete system support agency activities such as decision-making and operations. Particular attention will be given to the cross-functional systems, such as the program management system, and their linkages to the various function-specific management systems. An integrated “system of management systems” model is key to provide a basis for determining where data gaps exist within the systems, which process intersections are broken and if duplication of function exists.

Objective MS-1C: Align the NASA Enterprise Architecture to the integrated and individual management systems models, to facilitate the alignment of the IT investments with the needs of the management systems.

The NASA Enterprise Architecture provides a model of the business aspects of NASA and is used to assure strategic information technology decisions are made. The information management system delivers the information used within the management systems. It is key to align the information needs of the various Agency management systems with strategic investment decisions. Therefore, the Enterprise Architecture must be aligned with the “system of management systems” and the individual management system models.

The following mission support offices will be key to the achievement of this sub-goal and its objectives:

- **I&A/Management Systems Division:** Identify the common terms and standards used to describe the systems and for the system models. Work in conjunction with the functional-management-system owners to provide a definition and boundaries for the various systems.
- **IEMP:** production of process and data maps, basis of the models, of the various management systems,
- **OCIO:** support to IEMP and linkage of the models of the various management systems. Assurance that the generated data maps are accurate and the identified gaps are accounted for into the information needs of the agency through the Enterprise Architecture.
- **Various Mission Support Office Functional-System and Integrated System Owners:** Work in conjunction with the Management Systems Division to provide a definition and boundaries for the various systems. For example, PA&E, OPIL, OCFO and the OCE will provide the definition of the strategic management and governance system. As another example, the OCFO will provide the definition of the financial management system.

Sub-Goal MS-2: Ensure that an effective internal management controls system is developed and implemented.

An effective internal management controls system provides reasonable assurance that federally mandated requirements and NASA-specific control objectives are met. It provides for on-going monitoring of each management system and the integrated management systems, which is key to continually assess the effectiveness and efficiency of each. As the management systems are modeled, control procedures and metrics will be identified to monitor and measure the performance of each system. Further, to assure success in application of the controls a specific organization structure will be required to continually prioritize where the agency will focus in addressing the deficiencies of the management systems.

Objective MS-2A: Identify gaps and deficiencies between processes, policies, procedures and tools in, and/or barriers to success in fulfilling the purpose of the integrated system of management systems, and individual management system models.

Once the set of management systems and their integration is defined, the current management system architecture will be assessed against a model of what is needed for the agency. The difference between the baseline management system and what is needed will provide information on the gaps and deficiencies that exist and must be addressed. Further, reviews by various entities of NASA's management systems will be factored into what the agency will address in the processes, policies, procedures, organization structure and tools within each management system.

Objective MS-2B: Develop appropriate controls and performance metrics for processes effectiveness and efficiency.

Each of these systems and their integration must produce their products in support of the Agency's mission, the series of controls and metrics that are placed on them will allow NASA to assure that this is occurring. The objective of each management system, as well as the integrated management system, is critical for determining the appropriate controls and metrics. The correct controls and metrics applied to the processes, procedures and data flows through the management systems will be key to ascertain their effectiveness and assure efficiencies.

Objective MS-2C: Institute a continuous monitoring and reporting set of organizations, processes and procedures to track progress toward removing gaps and deficiencies, and ensuring the effectiveness and efficiency of the management systems.

Subsequent to identifying the deficiencies and gaps within the management systems, internal management control and system performance must periodically be monitored to ensure effective attention and continual emphasis on corrective action tracking and improving the control environment. Currently discussions are occurring as to what the correct organization structure and rules of engagement will be to assure the continual monitoring of the internal management controls. This organization structure must include:

- Ownership and management of the baseline management system(s) models,
- Configuration control of the leveraged requirements on the management system(s) and their integrated products,
- Ability for tracking and monitoring key management system performance metrics,
- Oversight on the development of appropriate controls, and
- Assessment of progress toward the removal of gaps and deficiencies.

The following mission support offices will be key to the achievement of this sub-goal and its objectives:

- **I&A/Management Systems Division:** Ownership and management of the agency baseline models both current and planned for the integrated system of management systems. Definition and then management of internal control process. Oversight on the effectiveness of the agency's internal controls. Support to management systems owners in identifying deficiencies and gaps.
- **PA&E/OPII:** Analytical support to I&A/MSD in identification of gaps and deficiencies in the integrated system of management systems.
- **Various Mission Support Office Functional-System and Integrated System Owners:** Work in conjunction with the Management Systems Division to identify their individual management system gaps and deficiencies. Development of appropriate controls and metrics to determine the effectiveness of their various systems.

Sub-Goal MS-3: Remove known existing deficiencies in the NASA management systems, including integration deficiencies.

There are several key deficiencies that exist in the current set of management systems that touch many of these systems. The deficiencies focus primarily on the integration across these systems. These are addressed in the objectives below. As the agency produces valid system models and identifies gaps and deficiencies in the baseline systems, these objectives will be expanded and further defined.

Objective MS-3A: Improve the processes and tools used for integration and coordination between determining NASA strategy, developing performance objectives and resource planning and allocation among all organizations and across the various management systems.

This objective is to assure the effectiveness of the Planning, Programming, Budgeting and Execution System. This is an objective that is also key and hence highlighted in the white paper that addresses the financial management system. There are several issues that must be resolved within this system:

- There is no recognized, complete, integrated and agreed to set of agency-level performance management processes that integrate the planning, monitoring and reporting of strategic, programmatic and institutional performance,
- Integrated implementation planning does not exist between programs and institution, and

- There is an incomplete set of processes, policies and tools that assure the alignment of all resources (funding, workforce, real property, information assets, etc) to mission.

Objective MS-3B: Develop the required policy and process to assure a continuous mission support planning and reassessment of alignment to and integration with mission.

As highlighted in the narrative for the above objective there is an incomplete and ad-hoc set of processes, procedure, policy and tools to assure the alignment of all agency resources to the mission. Specifically, an approach needs to be developed for on-going alignment of mission support functions to agency mission. This process and procedures are to be documented in the Mission Support Implementation Planning NASA Procedural Requirements and NASA Policy Document.

Objective MS-3C: Initiate a process to manage the external requirements leveraged on the agency, including classification, prioritization among and control of the various requirements, to assure the requirements are implemented in the most cost-effective and mission-aligned manner possible.

The collective set of policy, legislation and regulations provide a framework, both definition and constraints, within which each of the management systems functions. Often this set of requirements may set up conflicts between various management systems. Sometimes, these requirements are costly to implement, conflict with achievement of the NASA mission and remove activities that are effective and efficient. A level of management and control is required to deal with these requirements and assure the best balance of meeting the requirements and the achievement of the mission.

The following mission support offices will be key to the achievement of this sub-goal and its objectives:

- **PA&E:** Correction of deficiencies within the PPBE system. Linkage of mission support and mission planning activities to the process including workforce, infrastructure and acquisition planning. Assurance the integration of all planning.
- **OCFO:** Correction of deficiencies within the PPBE system.
- **OPII:** Assurance of the integration of all planning.
- **OCE:** Assurance of the integration of all planning.
- **I&A/Management Systems Division:** Oversight that the gaps and deficiencies in the various management systems are being addressed.

High Impact Objectives

In a three-day Mission Support Integration Planning (MSIP) workshop attended by approximately 64 Center, Headquarters, and IPT representatives, participants were asked to prioritize all IPT objectives by applying the following criteria:

13. Impact on Resources
14. Impact on Management Effectiveness/Efficiencies

- 15. External Implications
- 16. Future Sustainability of the Mission

In addition to this evaluation, all participants were asked to cast votes on the objectives they viewed as most critical to the Agency. As a result of these exercises, 24 of all IPT objectives were categorized as high priority and three of those 24 are the Management Systems IPT objectives. They are:

- MS-1B: Map the baseline, integrated system of management system architecture, including the interdependencies, intersections and combined products.
- MS-2A: Identify gaps and deficiencies between processes, policies, procedures and tools in, and/or barriers to success in fulfilling the purpose of the integrated system of management systems, and individual management system models.
- MS-2C: Institute a continuous monitoring and reporting set of organizations, processes and procedures to track progress toward removing gaps and deficiencies, and ensuring the effectiveness and efficiency of the management systems.

While accomplishment of all of the MSIPT sub-goals and objectives are important and necessary steps to improving the Agency's individual and integrated management system, the objectives listed above were considered by a cross-agency team to have the highest negative consequence to the Agency if not achieved, and therefore were determined to be the most critical objectives to pursue in the short-term.

VII. Performance and Accountability

Working jointly to meet these sub-goals and objectives, the Agency expects to achieve the following outcomes:

Outcome MS-1

Definition, documentation and Agency-wide communication of the components of the management systems to show their interrelationships, dependencies, and integration points.

Metrics

- A verified and validated flow map of the current function-specific management systems at the Agency level.
- A verified and validated mapping of the current state of interrelationships and interdependencies of those management systems identified.

Outcome MS-2

Risks to mission (from management system deficiencies and gaps) are identified and mitigated through an integrated internal management control program consisting of policies, procedures, and processes, consistent with standards for internal control in the Federal government.

Metrics

- Develop and implement a Management Control Plan that includes the Agency function-specific assessable units and outlines the standards by which each unit is evaluated. These standards are control environment, risk assessment, control activity, monitoring and communication.
- Select a subset of the Agency assessable units and sample those units against the internal control elements to ensure consistent execution of the plan.

Outcome MS-3

A clearly defined set of management system with processes and procedures that are unambiguous and effective, lines of authority and accountability that are documented and well understood, controls are continuously tested and monitored, resources and assets are effectively and efficiently managed.

Metrics

- Assess the design and effectiveness of the controls to prevent or detect deficiencies within function-specific management systems.
- Regularly monitor the corrective action to closure of known system deficiencies including the identification of root cause, corrective action plans, validations and verifications and closures.
- Test whether on-going monitoring is taking place within the function-specific management systems.

VIII. Issues and Risks

The following issues / problems are currently impacting the Agency's ability to fully achieve the high impact objectives defined in this White Paper.

Issue #	Issue/Problem Statement	Impact to IPT Plan	Remediation Approach
MS-I1	There is no single entity that is responsible for coordinating the work to achieve the sub-goals, objectives and mitigate the risks contained in this white paper.	Inefficiencies exist with the lack of coordination that lead to duplication of effort and/or incomplete addressing of the objectives and risks.	Identify a single organizational entity to monitor the Agency's work toward the sub-goals and objectives outlined in this white paper.
MS-I2	In the past little focus has been placed on defining and controlling the NASA management systems, hence there is not a large knowledge and skill base in this arena.	Timing of the objectives and their completion, especially if the knowledge and skill require development from within the agency,	Contract out discrete tasks in support of the goals and objectives.

The following risks may prevent the Agency from fully achieving the sub-goals, objectives and outcomes defined in this White Paper. Mitigation strategies for these risks are being developed and will be included in a future version of this white paper.

Risk #	Concern	Risk Statement	Likelihood	Consequence
MS-R1	The system mapping effort is currently not in the Agency's plans to the extent required.	Given that sufficient resources (funding, personnel, etc.) are unavailable to develop the system flow maps, there is a possibility that the Agency will not have the ability to internally identify and then mitigate the risks to mission introduced by the deficiencies and gaps within the management systems. <i>(MS-1B)</i>	4	4
MS-R2	There is a high level of mistrust between NASA organizations and clear stovepipes.	Given that there is lack of cooperation from appropriate organizations to develop the function-specific management systems flow maps, there is a possibility that the information required to produce the maps will be incomplete or unavailable. <i>(MS-1B)</i>	4	4
MS-R3	Lack of in-house knowledge and skills about management systems definition and modeling.	Given that there is incomplete knowledge of function-specific management systems to develop the flow maps, there is a possibility that the Agency will not be successful in producing the required set of maps in the timeframe needed. <i>(MS-1B)</i>	2	5
MS-R4	The management systems of the agency are not clearly defined or bounded at this time.	Given that there is a lack of understanding of what management systems are and that there is no clear charter for each one, there is a possibility that a mapping of the management systems will be fragmented or incomplete. <i>(MS-1B)</i>	3	4
MS-R5	There is a lack of standardization across the multiple NASA entities involved in any management system.	Given that there is no organization allowed to set and determine standards for management system models including bounding conditions, the various management systems will not be modeled and defined with enough commonality to integrate. <i>(MS-1B, MS-2A)</i>	4	5

MS-R6	NASA organizations are at different levels of readiness/ understanding of what constitutes a management control.	Given that the Agency does not fully understand and may not be ready to incorporate internal controls, there is a possibility that the internal controls implemented won't be effective across all of the systems and some of the most significant gaps and deficiencies will not be addressed. (MS-2A)	3	4
MS-R7	Lack of in-house knowledge and skills about management systems definition and modeling.	Given that a comprehensive gap and deficiency analysis is not conducted, there is a possibility that the Agency will not have the ability to identify and mitigate all risks related to mission introduced by duplication, wasted resources, etc. (MS-2A)	3	3
MS-R8	Sustainability of efforts through management changes	Given that there is lack of support from senior management as a result of a change of that management to conduct on-going system performance monitoring and reporting, there is a possibility that the Agency will not have comprehensive information regarding the management system to make accurate decisions. (MS-2C)	3	3
MS-R9	Sustainability of efforts through management changes	Given that sufficient resources are unavailable to complete the effort, there is a possibility that the Agency will experience degradation to performance resulting in an increased likelihood of Agency material weaknesses. (MS-2C)	3	4
MS-R10	Inability to reach agreement on controls and metrics due to the diversity of needs across and independence of the NASA organizations.	Given the diversity of various organization needs and starting conditions, there is a possibility that consensus on and the integration of appropriate controls and metrics cannot be achieved for each management system and the integration. (MS-2C)	3	3

RISK ASSESSMENT

